THE IMPACT OF THE INTERNET ON SMALL FIRMS

A thesis
submitted in partial fulfilment
of the requirements for the Degree
of
Master of Commerce in Accountancy,
Finance and Information Systems
in the
University of Canterbury
by

ROSS A. MARTIN

University of Canterbury
New Zealand
1998

TABLE OF CONTENTS

FIGURES

TABLES

ACKNOWLEDGEMENTS

This thesis has been a thorn in my side, and the relief I feel at its completion would not be possible without the valued assistance of several people.

Foremost I must express my gratitude to Dr. Paul Cragg whose guidance and enthusiasm for this study were key aspects of its successful completion. His open door policy, the access he provided to his library of materials, and his suggestions for improvements in each chapter were invaluable. In addition to this the financial assistance he provided for the research went well above the call of duty and I cannot thank him enough.

I would also like to thank Dr. Annette Jones; as co-supervisor her approachability, and the valuable feedback and encouragement she provided during our discussions were greatly appreciated.

In addition I am indebted to the participants of the case studies, for the time they gave up for interviews, and for the expediency with which they attended to my e-mail enquiries. Without these people the study could not have been performed.

Finally I must give thanks to my friends and family, whose patience and understanding during times of stress were appreciated. Thanks especially to my mother for her considerable financial support during my studies.

ABSTRACT

Several researchers have designed frameworks to model and analyse impacts of the Internet on firms. This research takes one such framework aimed at small firms (Lymer et al., 1997b) and attempts to validate its usefulness by comparing it to similar and conflicting models, and by applying it to impacts collected from both the literature and from four case studies of small firms.

The findings suggest that several changes to Lymer et al.'s (1997b) framework are necessary to make the model more effective and more practical for researchers and practitioners. A revised Internet impacts model is proposed that incorporates these changes.

Preliminary evaluation has been performed on the revised model, resulting in the conclusion that the study makes a valuable contribution to the area of Internet research by significantly enhancing the usability and analytical usefulness of Lymer et al.'s (1997b) Internet impacts model.

1. INTRODUCTION

1.1 BACKGROUND

As the Internet grows larger and more popular, firms are increasingly coming under pressure to take advantage of the facilities and opportunities it offers, while sidestepping the difficulties and challenges that it presents. In an environment where competitive advantage can hinge on how long a Webpage takes a potential customer to load, or whether a firm has made the move to online transactions yet, companies have to make sure that they make the correct decisions concerning the adoption and use of the Internet. Studies indicate that the Internet is going through a period of massive growth, with the number of users doubling in size annually since 1988 (Bennet, 1997). In 1996 there were approximately 68 million users of the Internet. One study estimates that this figure could rise to 250 million by 2000 (Davenport, 1996), a less conservative figure is 500 million (Hamill, 1997). Obviously the Internet is becoming a critical new area for businesses to explore; however, research into the impacts the Internet can have on firms is still in its infancy.

The Internet is not one entity but a cluster of innovations including the World Wide Web, FTP, E-mail, Newsgroups, Archie, Gopher, and many other components. Firms will generally adopt parts of it over time, often starting with e-mail, progressing to browsing the World Wide Web, and then hosting a Website of their own. Firms will realise different impacts and benefits depending on what part of the Internet they are using, and what they are using it for (Angehrn, 1997).

Several researchers have proposed frameworks to model or measure the impacts of the Internet on firms. This research is concerned with testing the Internet impacts model developed for small firms by Lymer et al. (1997b).

1.2 RESEARCH OBJECTIVE

The goal of this research was to test Lymer et al.'s (1997b) model of Internet impacts, and to refine this model if necessary. The research was conducted in four phases.

1.2.1 Phase One

A review of the relevant literature to determine the nature of impact, to discover potential categories of impact, and to determine if all the identified impacts were able to be classified in terms of Lymer et al.'s (1997b) model.

1.2.2 Phase Two

The application of Lymer et al.'s (1997b) Internet impacts model to analyse data collected from four small firms. In effect, a theoretical replication of Lymer et al.'s (1997b) case studies.

1.2.3 Phase Three

The application of another impacts model (Lederer et al., 1997) on the data from the selected firms, to determine whether the two models produced similar results.

1.2.4 Phase Four

The consolidation of suggestions made in phases one through three to create a revised model of Internet impacts.

1.3 RESEARCH CONTEXT AND VALUE

Statistics show that businesses with under 100 employees make up 99% of all economically significant firms (firms with greater than $30000 annual GST expenses) in New Zealand. Businesses with under five employees make up 83% of all economically significant firms (Statistics New Zealand, 1998, p. 34). This makes small firms a vital part of the New Zealand economy (Bollard, 1989).

Several frameworks in the literature deal with the impact of the Internet on large firms, but as Welshe and White (1981) recognise, a small business is not a little big business. Lymer et al.'s (1997b) Internet impacts framework is a new and relatively untested model that is specifically designed for small firms. Testing this framework makes a useful contribution to impact literature in general, and is also particularly relevant for the New Zealand environment where small firms play a vital role in the economy.

In a study by Brancheau et al. (1996) of key issues facing executives in IS management, measuring IS effectiveness and productivity was ranked 11th, and increasing the understanding of the IS role was ranked 13th. By attempting to clarify some of the

confusion, and reconcile some of the conflicting studies about use, impact, and success of IS, this research makes a genuine contribution to the field.

Raymond (1985) has commented on the difficulty in isolating and measuring the effects of technology. This study helps isolate the effects of technology, which may make measurement less problematic for future researchers. In this way, a useful contribution is made not only for future studies of impact, but for any field where impact plays an important role.

This research goes some way towards filling the gaps identified. It also extends, and helps validate what could potentially be a very useful model (Lymer et al., 1997b) for enhancing the understanding of the impact of the Internet on small firms.

1.4 THESIS STRUCTURE

Chapter Two reviews the literature on IS adoption, use, effectiveness and success. The main framework for this research (Lymer et al., 1997b) is also introduced and discussed.

Chapter Three outlines the research method used for this study. After describing various studies and impacts frameworks contained in the literature, the goal of the research, and how it was conducted is formally introduced. The chapter justifies the choice of multiple case studies for the research, describes the site selection criteria, and discusses data collection and analysis methods, along with validity and reliability issues.

Two major goals of the research were to produce a list of empirically tested Internet impacts, and to review frameworks that have been designed to capture the impacts of either the Internet or information systems on firms. Chapter Four addresses these goals. Lederer et al.'s (1997) framework is also introduced in this chapter, and the usefulness of comparing it with Lymer et al.'s (1997b) model is discussed.

The case studies are analysed and discussed in Chapter Five. Both Lymer et al.'s (1997b) Internet impacts model, and Lederer et al.'s (1997) Internet impacts questionnaire are used to analyse the data collected from each site. The results are then compared, and any issues raised about the utility of Lymer et al.'s model are discussed.

Chapter Six consolidates the suggestions and issues raised in Chapters Four and Five to propose a revised model of Internet impacts. The model is described in detail, and a brief evaluation is performed by mapping to it data from the literature and the cases.

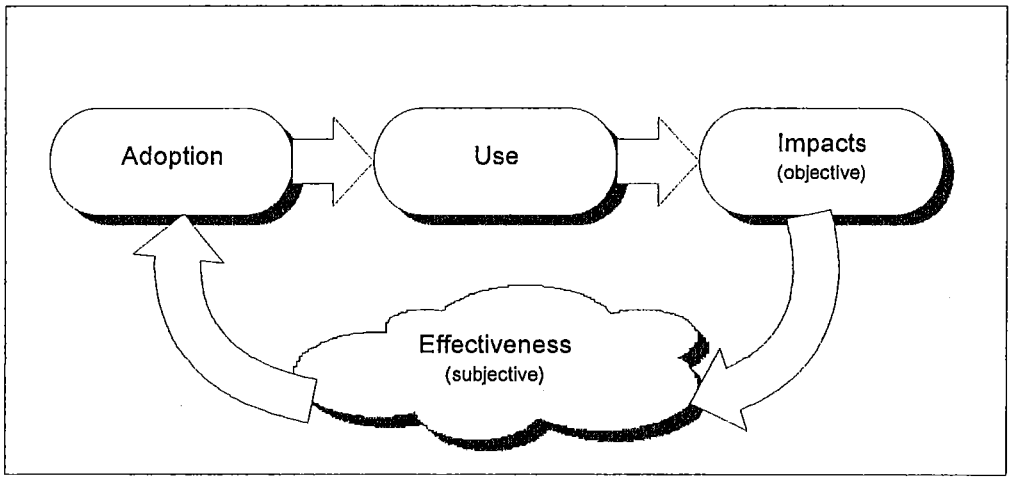
The thesis is concluded in Chapter Seven with a general discussion of the results. Limitations, and implications for researchers and practitioners are also discussed.

2. LITERATURE REVIEW

2.1 INTRODUCTION

Effective use of the Internet by companies is ideally a continually evolving and iterative process (Seddon, 1997a). Factors such as the perceived usefulness of the Internet, and organisational readiness initially lead to adoption of part of the net (Seddon, 1997a). Use of the Internet within the firm inevitably leads to impacts or consequences from that use, and those impacts are evaluated as successful or otherwise. Success often encourages adoption and the cycle starts over (Figure 2-1).

Figure 2-1 Simplified IS Success Model (Adapted from Seddon, 1997a)



This chapter reviews the literature on each aspect of the above model. The chapter also details the major frameworks used in this study. A major goal of the literature review was also to produce a list of empirically tested Internet impacts, and to review frameworks that have been designed to capture the impacts of either the Internet or information systems on firms. The impacts and frameworks discovered are used in the analysis phase of this research, and are discussed in detail in Chapter Four.

2.2 CLARIFICATION OF INTERNET USE, IMPACT, AND EFFECTIVENESS

There has been some confusion over the boundaries of the concepts of Information Systems (IS) use, impact, effectiveness, and success when referring to information systems. Seddon (1997a) pointed out that there were potentially three different meanings that could be attributed to the term "IS Use" in DeLone and McLean's (1992) model of IS success. He said that the "result is a level of muddled thinking that is likely to be counter productive for future IS research" (Seddon, 1997a, p. 242).

Many researchers have treated IS use as an indicator of IS success (Raymond, 1985; Baroudi and Orlikowski, 1988; DeLone and McLean, 1992). This interpretation assumes that the more a system is used, the greater the benefits it provides. Other authors see "IS use" as simply a way to describe behaviour (Cronin, 1995; Lim, 1995; Poon and Swatman, 1995). Often the boundary between IS use and IS impact is not made clear (Lymer et al., 1997a,b), and the boundary between IS impact and IS success is not made clear (Iacovou et al., 1995).

Figure 2-1 shows a suggested way of conceptualising IS success and its components, use, impact and effectiveness (adapted from Seddon's 1997a model of IS success[1]). Use is merely a behaviour, not a proxy for IS success, nor a measure of impact. Use leads to consequences of, or impacts from use. These consequences are not evaluated as either good or bad. IS effectiveness is determined by an appropriate stakeholder analysing the impacts from use. Effectiveness is treated as a subjective measure as what is important to an organisation may not be so to an individual or group (Seddon, 1997b). These elements together help form the paradigm of IS success. If IS use leads to generally positive impacts which are judged to be effective then the IS implementation can be said to be successful.

Iaocovou et al. (1995) describe EDI Impact as "the actual benefits adopters receive from utilizing EDI" (p. 468). They then use the level of system integration as a surrogate measure for the impact of the technology. DeLone and McLean (1992) define

[1] See Appendix C.

organisational impact as the effect of IS on organisational performance. They describe cost benefit analyses, and individual decision performance as potential ways to measure the organisational impact of IS.

It is difficult to reconcile either of these definitions with the suggested conceptualisation of use, impact, and effectiveness of impact in Figure 2-1. Both authors tend to equate *impact* with *effectiveness of impact*. Seddon (1997a) argues that the leap from identifying impacts to measuring the effectiveness of those impacts necessarily implies the adoption of someone's point of view. The perception of whether an impact is beneficial or detrimental depends largely on the who is analysing the impacts and for what purpose.

Seddon (1997b) reviewed 192 papers that used empirical IS effectiveness measures, and found that all could be classified in terms of their IS Effectiveness Matrix (Appendix C). The grid categorises effectiveness measures for different systems and stakeholders. Every stakeholder requires different measures of IS effectiveness. For example being able to browse the World Wide Web may be positive for an employee whose primary focus may be to have fun, but it may not be so positive for the firm which needs to be productive and successful. The benefits or effectiveness of impacts from the Internet can often change depending on the reason they are being evaluated. With the multitude of impacts and success measures[2] that have been developed it is helpful to be able to identify which techniques may best fit each individual situation.

For the purposes of this research the stakeholder is the organisation, and the systems being measured are Single IT Applications (i.e. various parts of the Internet) and a Type of IT (i.e the Internet as a whole). Please refer to Appendix B for a graphical representation of where this research fits into the "larger picture" of IS use, impact, and effectiveness.

---

[2] See Sections 2.5 and 4.3.

2.3 INTERNET ADOPTION

Although there is a paucity of research concerning adoption of the Internet by firms, several studies have focused on reasons for adopting innovation in general (Damanpour, 1991; Prescott and Van Slyke, 1996), and Electronic Data Interchange (EDI) in particular. Mehrtens (1997) adapted Iacovou et al.'s (1995) model of EDI adoption for use with the Internet (Figure 2-2). The model suggests that there are three causal factors that lead firms to adopt the Internet or part of it: Perceived benefits, organisational readiness, and external pressure.

2.3.1 Perceived Benefits

Mehrtens (1997) divided Perceived Benefits into two sub-categories. 1) Relative advantages of the Internet over traditional means of disseminating and researching information. These advantages include the reach, flexibility, simplicity, and speed of using the Internet for commercial gain. 2) Communication. The Internet can be used as a tool to help facilitate personal and inter-organisational communication through the use of e-mail. Company web sites can be used to send information and receive feedback from potential customers. With techniques such as banner advertising and push technologies emerging, well targeted direct marketing through the Internet is becoming a reality also.

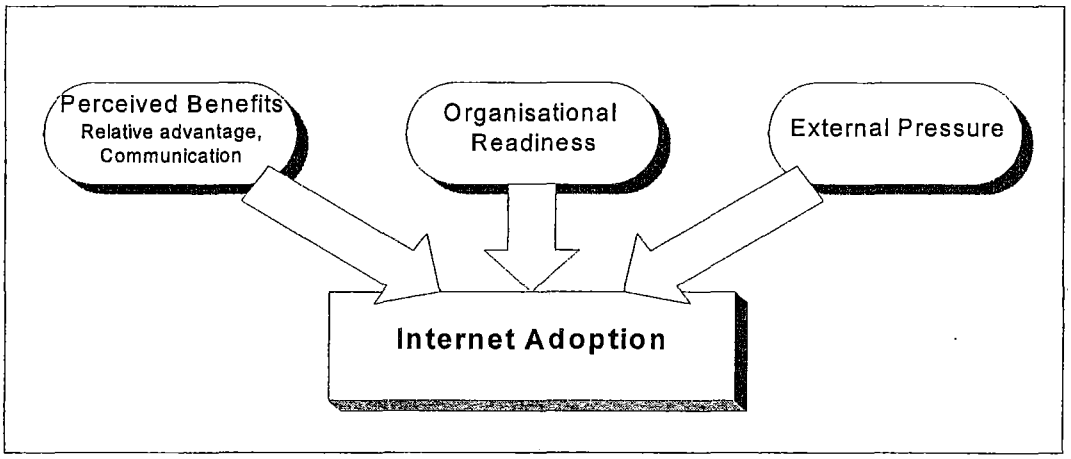
2.3.2 Organisational Readiness and External Pressure

Organisational readiness refers to the "level of financial and technical resources" of the organisation that is thinking of adopting the Internet (Iacovou et al., 1995). It may be a deterrent to adoption if the firm does not have an appropriate technical platform from which to base the launch of the Internet. Obsolete networks and computer hardware are often expensive to update, so the perceived benefits have to be seen to outweigh any potential costs in readying the organisation to take advantage of this new technology.

External pressure should play a bigger role in leading to adoption as the Internet continues to mature. Major increases are expected in e-commerce over the coming years. New

Zealanders spent US$10.3 million shopping on the Internet in 1997. By 2001 it is expected that they will spend US$655 million (Russell, 1997). Governments, telecommunications companies, banks, universities, and many other types of businesses are online. Firms that delay announcing their presence on the Internet may potentially be losing out on a massive customer base.

Figure 2-2 Internet Adoption Model (Source: Mehrtens, 1997)



2.4 USE OF THE INTERNET BY FIRMS

There have been many surveys and studies done to determine how companies use the Internet. Cockburn and Wilson (1996) identified many uses of the Internet by businesses. Among them are publicity, marketing, advertising, selling, R&D, communication, and collaboration. Poon and Swatman (1995) added customer access, and business networking. Cronin (1995) named access to free software, informal know how trading, time compression, e-mail, public relations, access to databases, and prospecting. Other researchers such as Cronin et al. (1994), Lim (1995) and Abell and Black (1997) have also confirmed these uses and added others.

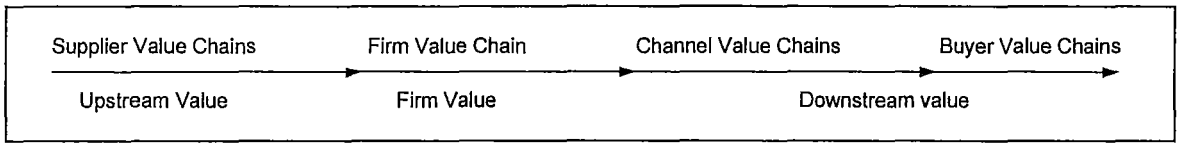
There are also negative aspects. Although commercial use of the Internet has become the fastest growing part of the World Wide Web (Hamill, 1997), the Web is "often perceived by the business community as not being useful" (Cockburn and Wilson, 1996, p. 92). In a

review of business use of the Web, Cockburn and Wilson (1996) describe several problems currently affecting firms that are on the Net. These problems include information overload, the development of secure sites, the development of suitable online payment systems, slow connection times, and the unattractiveness of online shopping to users.

For the purposes of this research the above literature really only serves to acknowledge that there are many different ways a business can utilise the Internet, and many problems that can be encountered. More useful, is the literature that attempts to take these business uses and clarify them by categorising them, or inserting them into frameworks.

A useful framework for use of the Internet may be Porter and Millar's (1985) value system model (Figure 2-3). The model includes the value chains of the firm, its suppliers, and its customers, but is useful here not necessarily for its depiction of the value chains, but for its portrayal of the entities affected by information technology, from the supplier, to the firm, to the customer.

Figure 2-3 Porter and Millar's (1985) Value System Model



Several authors have developed frameworks for use of the Internet than can be classified in terms of Porter and Millar's (1985) model. Cronin (1995) categorised business use of the Internet into: customer relations, dealing with suppliers, and internal company operations. This covers three of the four aspects of Porter and Millar's value system model.

Ho (1997) classified use of the Internet into: business to business relations, and consumer market. However this framework seems to neglect the potential that the Internet offers for information gathering and other internal activities, covering only the supplier, channel, and the buyer portions of the value chain model.

Angelides' (1997) model focuses on the buyer. The model is concerned with developing relationships with customers by utilising the Web. He describes four types of online communities that companies can use to target and understand their customers: 1)

communities of transaction, used for buying and selling. 2) communities of interest, where customers share ideas with one another possibly in real time. 3) communities of fantasy, where visitors create new environments, personalities, or stories. 4) communities of relationship, where people come together to share personal experiences. Angelides asserts that using the Web to develop relationships with customers in this way helps to increase diffusion and risk in decision making.

Angehrn's (1997) ICDT framework is similar to Angelides' (1997) but can cover all four aspects of Porter and Millar's (1985) model; internal operations, suppliers, channels, and customers. It consists of: 1) information gathering; 2) transactions; 3) distribution; and 4) communication. Angehrn's theory is that firms will advance through these four areas as their Internet use and strategy becomes more sophisticated.

Cappel and Myerscough's (1996) framework is more difficult to reconcile with Porter and Millar's (1985) model. Cappel and Myerscough identified five types of use for the Internet: marketplace awareness, customer support, sales, advertising, and information provision. These seem to be mainly internal, and customer oriented uses.

Frameworks and models such as these make it easier to work with and classify the data pertaining to business use of the Internet. They may also provide the foundation for future models describing business use, or impacts of the Internet on firms.

2.5 IMPACTS AND EFFECTIVENESS OF THE INTERNET FOR FIRMS

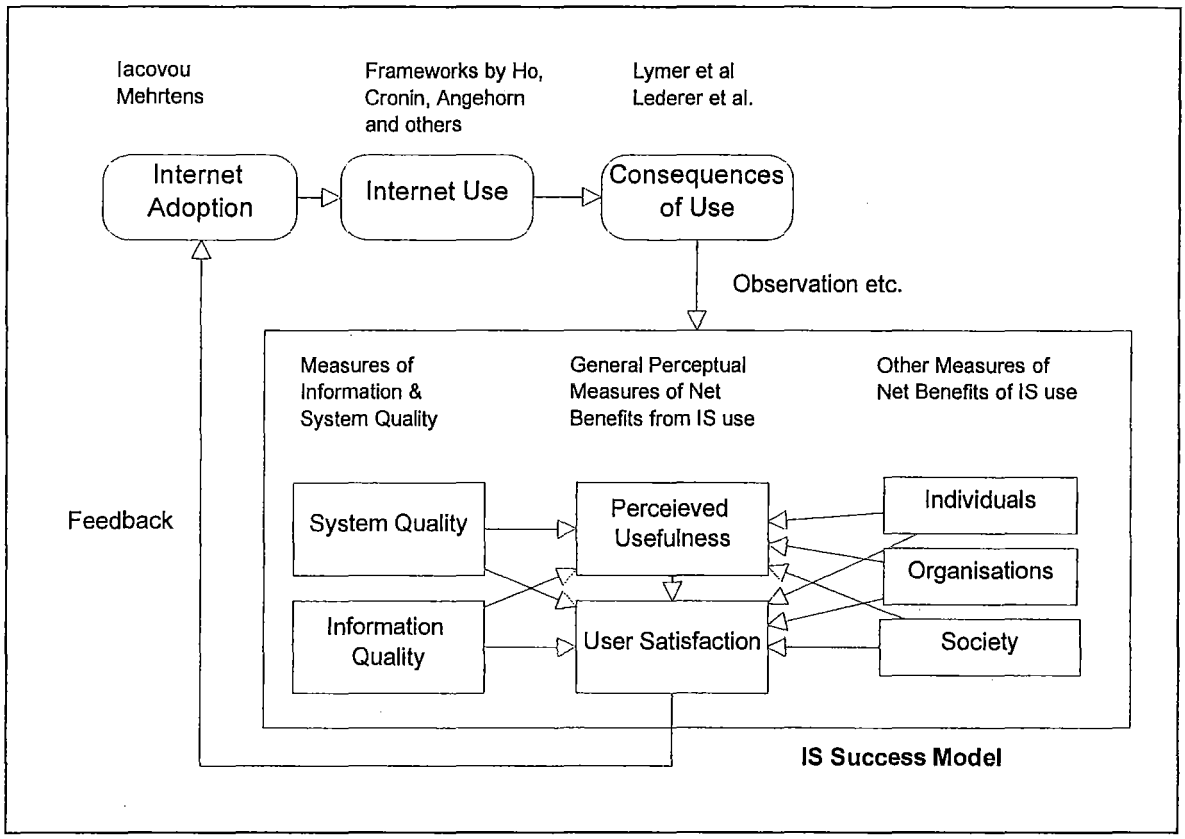
A review of the literature for impacts of the Internet on firms led to the discovery of 120 observed impacts, from thirteen empirical studies. These impacts are listed in Table 4-2 and are used to help test Lymer et al.'s (1997b) model, which is the major goal of this research.

These individual impacts are interesting but by themselves offer little value to a researcher or practitioner wishing to analyse or judge the impacts of the Internet on any other firm. Models and frameworks that categorise individual impacts, or provide for some way to

analyse them offer more value. The following discussion indicates the current views on analysis of impacts of the Internet and information systems in general, and considers the progression from strictly cost-benefit based methods of analysis to the richer approach that is advocated today.

Seddon's (1997a) respecification (Appendix C) of DeLone and McLean's (1992) model of IS success (Appendix G) provides a useful foundation for discussing the impact and effectiveness of impact of the Internet on firms. Seddon's model has been adapted slightly (Figure 2-4) to make it more applicable to the Internet.

Figure 2-4 Adaptation of Seddon's (1997a) model



Adoption of the Internet is generally instigated once perceived future benefits, organisational readiness, and external pressures[3] force the decision. Use of the Internet inevitably leads to consequences (or impacts) of use. Success, or benefits from impacts is a

[3] See Section 2.2.

stakeholder dependent measure, and is evaluated in different ways. If the impacts are seen to be successful, then it is likely that adoption of some new aspect of the Internet will result (Seddon, 1997a). Impacts are measured objectively, and effectiveness is a subjective measure, however many studies do not draw a distinction between impacts and effectiveness, preferring to discuss them both under the umbrella of success.

The model is consistent with the current prevailing view that there is no one measure of information systems success (Delone and McLean, 1992; Seddon, 1997b). However this consensus has not come quickly, Farbey et al. (1992) commented that "the success of Return On Investment for non IT projects has lead researchers to try to find a single technique which can deal with all IT projects in all circumstances". Similarly Weil and Olson (1989) comment that although IS performance is a multifaceted concept many researchers have chosen single measures to surrogate performance.

Willcocks and Lester (1991) in a survey of 50 firms concluded that most still use cost benefit analysis techniques to measure effectiveness of information systems. Brown (1994)[4] while moving away from the paradigm that a single measure is best, and arguing for more appropriate IS evaluation techniques, notes that the soft benefits of IT projects are difficult to value but are of increasing significance. This view was also taken by Van Wegen and de Hoog (1996). In their information commodity approach to the measurement of effectiveness, the authors note that their model does not take into account subjective features of an information system and that it should be applied in combination with other methods.

Studies such as these may have led to the realisation that "current evaluation techniques are frequently inadequate" (Ward et al., 1996, p. 214). When intangible benefits have been considered in the past they have often been pertinent only to the internal operations of the firm and not to the strategic marketplace. Naylor and Williams (1994) reported that research on information systems success has typically focused on measures of user satisfaction (Bailey and Pearson, 1983), system usage (Raymond, 1985), and impact on organisational performance (Hiltz, 1988).

Bailey and Pearson (1983) stress that measures of market impacts as well as the traditional internal firm measures such as productivity need to be utilised. This is especially relevant given that information systems have moved from being purely operational and support tools, to having a competitive and strategic effect on the firm (Farbey et al., 1992). DeLone and McLean (1992) also stress that multiple measures of IS success are necessary and that both internal and market impacts need to be considered.

As many firms will have different needs it seems naïve to measure success based solely on singular variables such as user satisfaction, or level of system use, or the many other measures of systems success that have been used in the past. It has been suggested that there is no one dependent variable for determining IS, or Internet, success (Seddon 1997a). Companies should choose from the many measures those that best fit their culture.

2.6 LYMER ET AL.'S (1997B) INTERNET IMPACTS MODEL

A major aim of this research is to test Lymer et al.'s (1997b) Internet Impacts Model (Figure 2-5). The model was developed after a review of IT impact literature, and has been tested in a number of small firms. The model has been used for cross-business analysis, and was successful in drawing out common features that were found in successful implementations of the Internet (Lymer et al., 1997b).

The framework consists of a two dimensional 4x5 matrix structure. The vertical axis contains five categories of Internet impacts ranging from communications, and information retrieval, to managing and utilising the new application, and environmental impacts on the firm.

---

4 Cited in Ward et al. (1996).

Figure 2-5 Lymer et al.'s (1997b) Model of Internet Impacts

Matrix Model Of Internet Impacts

Categories Of Impact			Levels Of Impacts			
			External		Internal	
			Business Contacts	Industry	Organisation	Task
Input		Communication (2 way)	Collaborative work made easy Helplines online	Expert Support	Management to staff dialogue improved	Collaboration between tasks Enhance speed of task
		Information Retrieval (1 way)	Access to static data (eg specs) Dynamic updates of changing data sources	Industry data of use to members	Intranet/Internet access to business wide data	More data for input to process
Output		Knowledge Management	Distribution of Knowledge Accessibility of expertise/ product	Contribution to industry wide expertise(eg. best practice, working parties)	Improved opportunity for maintenance of business knowledge longer term	Storing of knowledge improved Mobility of task knowledge improved
		Productivity (Use of Knowledge)	Mode of delivery improved/ made cheaper	Participation in industry	Training and sharing of knowledge around business	Speed of distribution Modes of delivery altered
		Environment (context of impact)	Intranets/Extranets Discussion groups	Industry training and support	Creation of up-to-date computing environment EDI/EC implications Computing expertise needed across business Teleworking	Introduction/updating of computing support Reliance on computer for task completion

Each category of impact can affect the firm in different ways, so the categories are broken into levels of impacts. From the internal firm and task based impacts, to external industry and business contacts impacts. For an in depth description of the Lymer et al.'s (1997b) impacts model see Appendix A.

The model subsumes some of the frameworks described in Section 4.3. It is used in Chapter Four to map the impacts that have been extracted from the literature. A detailed analysis of the model is performed in Chapter Six.

2.7 CONCLUSION

This chapter has given an overview of the adoption, use, and impacts literature. It has clarified the demarcation between use, impact, and success. The chapter has also identified a list of observed impacts, and described various frameworks that have been used in the past to categorise these kinds of impacts. Lymer et al.'s (1997b) Internet impacts model

was described, and the aim of this research was put in context to the field of Internet adoption, use and success.

3. RESEARCH METHOD

3.1 INTRODUCTION

This chapter outlines the research method used for this study. After describing various studies and impacts frameworks contained in the literature, the goal of the research, and how it was conducted is now formally introduced.

The first sections describe the objective of the research, and an overview of the steps necessary to achieve that objective. Next the method is described in more detail, and the multiple method approach justified. A description of the site selection criteria follows, along with the steps taken to initiate contact with the case sites. Data collection and analysis methods form the majority of the chapter, and finally validity and reliability issues are discussed.

3.2 RESEARCH OBJECTIVE

The goal of this research was to test Lymer et al.'s (1997b) model of Internet impacts, and to refine this model if necessary. The unit of analysis was the Internet as it relates to small firms. To achieve this objective, the case study method was employed, together with a literature review of similar and conflicting IS impact frameworks.

3.3 RESEARCH DESIGN

The thesis was divided into four phases; three methods of testing Lymer et al.'s (1997b) Internet impacts model were employed, and the fourth phase dealt with refining Lymer et al.'s model of Internet impacts.

3.3.1 Phase One

A review of the relevant literature to determine the nature of impact, to discover potential categories of impact, and to determine if all the identified impacts were able to be classified in terms of Lymer et al.'s (1997b) model.

The literature review was performed as a check on the construct validity of the model (Yin, 1994), and also to clarify the confusion between uses of different terminologies in the literature on impact. Comparison of Lymer et al.'s (1997b) model with similar and conflicting literature served to build internal validity, improve construct definitions, and sharpen generalisability (Eisenhardt, 1989).

Phase one is described in Chapter Four of this thesis.

3.3.2 Phase Two

The application of Lymer et al.'s (1997b) Internet impacts model to analyse data collected from four small firms. In effect, a theoretical replication of Lymer et al.'s (1997b) case studies.

Phase two, the replication of Lymer et al.'s (1997b) research was performed as collecting data from new informants, settings, or events is useful to test the external validity and generality of the research (Miles and Huberman, 1984). Yin (1994) states that replication of findings is necessary for the external validity of the research, i.e. whether the results are generalisable beyond the immediate case study.

Phase two forms part of Chapter Five of this thesis.

3.3.3 Phase Three

The application of another impacts model (Lederer et al., 1997) on the data from the selected firms, to determine whether the two models produced similar results.

The third test was a form of theory triangulation intended to show the extent to which independent measures of impact agreed. The purpose was to enhance the external validity of the model by confirming it with another instrument measuring similar traits (Miles and Huberman, 1994).

Phase three is covered in Chapter Five of this thesis.

3.3.4 Phase Four

The consolidation of suggestions made in phases one through three to create a revised model of Internet impacts.

Phase four is described in Chapter Six, and addresses the issues that were raised in Chapters Four and Five to create a revised model that would be more useful to practitioners and researchers

3.4 METHOD

3.4.1 The Case Study Method

Lymer et al.'s (1997b) model was designed to be used in conjunction with case studies.

Case studies are most useful for their ability to capture the richness of a situation. Unlike surveys or other quantitative methods, the data gathered is not isolated from its real life context (Hartley, 1994; Yin, 1994). Benbasat et al. (1987, p.370) list three strengths of the case study method: 1) the researcher can study information systems in a natural setting and generate theories from practice; 2) the method allows the researcher to understand the nature and complexity of the process taking place; 3) valuable insights can be gained into new topics emerging in the rapidly changing information systems field.

The loudest and most persistent argument against case research is that it provides little basis for scientific generalisation (Yin, 1994, p. 10), and that it is often lacking in rigour and reliability (Hartley, 1994). However the purpose here is to expand and generalise a theory, not to generalise to populations. Also as Hartley (1994, p. 208) points out: there is nothing about a method *per se* that makes it weak or strong, what is important is how the researcher attends to the potential weaknesses of the method.

The emphasis in this research is on understanding the impacts of the Internet in conjunction with their organisational contexts, thus case studies are most appropriate. Although the data collection for this study could have been performed through a survey, such quantitative methods are generally unable to compete with the richness of information that interviews and other case study methods can provide (Miles and Huberman, 1994).

Data was collected through semi-structured open response interviews (King, 1994), analysis of company documentation, and feedback from participants regarding preliminary analysis. In addition to these traditional qualitative sources (Yin, 1994), use was also made

of a questionnaire to determine whether pre-defined impacts were present. This is a form of data triangulation, the questionnaire is used as a "check" on the case study data, and the case study is used to extend the questionnaire data and to provide a fuller picture of the organisation.

Combining qualitative and quantitative data such as this can prove valuable in several ways (Kaplan and Duchon, 1988). Areas that require further exploration may be uncovered if there are apparent inconsistencies between interview data and questionnaire results. Mixed methods are likely to lead to new insights that would not be possible otherwise (Kaplan and Duchon, 1988). Different methods of collecting evidence also help to develop a contextual richness that again would not be possible with just one method (Cavaye, 1996); that richness is a vital ingredient in model building (Gable, 1994). Another advantage of combining questionnaire data with case data is that it "improves the internal validity and interpretations of quantitative findings through triangulation" (Gable, 1994, p. 120).

Benbasat et al. (1987) identify several common shortcomings in studies that have employed the case study method: 1) the objective of the study was seldom clearly specified; 2) the unit of analysis for the case study was often not provided; 3) data collection methods were not described. Each of Benbasat at al.'s concerns have been addressed in this thesis.

3.4.2 Multiple Cases

Multiple case designs should be used for theory building or theory testing (Benbasat et al., 1987; Yin, 1994). Multiple cases promote generalisability, and allow for cross-case analysis and the extension of theory (Benbasat et al., 1987).

Lymer et al. (1997b) intended that their Internet model be useful in cross-business analysis of impact. The multiple case study approach is ideal for testing this facet of the model, as it allows for literal replication over several types of firms (Yin, 1994, p. 45). Different firms were selected both from Angehrn's (1997) four types, and from across industries, and cross-case analysis was undertaken to compare the results. Multi-case designs are also useful to verify that events and behaviour are not merely the result of one idiosyncratic setting (Miles and Huberman, 1994).

3.5 SITE SELECTION

3.5.1 Criteria for Selection

Selection of appropriate case sites is important to enhance the generalisability and reliability of the findings, especially when developing or extending new theory (Eisenhardt, 1989). As is usual with this type of research, the case sites were chosen to "fill theoretical categories and provide examples of polar types" (Eisenhardt, 1989, p. 537). Angehrn's (1997) ICDT framework provided the categories, and within each category, one firm was selected, bringing the total initial number of cases to four. Eisenhardt (1989) suggests that the empirical grounding of a theory is likely to be unconvincing with less than four cases. It was anticipated that more case studies would have to be performed if new categories of impacts were still being discovered after the fourth case (Eisenhardt, 1991), but this proved not to be necessary.

The criteria for selection were:

1) Small firm in the Canterbury area.

2) Must use the Internet within the firm.

3) Must have had a Website for at least one year.

4) Must have at least one firm from each of Angehrn's (1997) four categories.

5) Must have firms from a cross-section of industries.

A small firm is defined by Bollard (1989) as one with fewer than 100 employees. That was the upper bound used for this research. There has been little significant research into the impact of the Internet on small firms, the frameworks of Lymer et al. (1997b), and Lederer et al. (1997) being exceptions. Studying small firms is very topical to New Zealand as 90% of businesses in this country have fewer than ten employees (Hamilton and English, 1993).

The aim of criterion two is to ensure that firms selected were sufficiently evolved in their use of the Internet for significant impacts to have manifested themselves.

Criterion three gives the opportunity to compare and contrast results between Angehrn's (1997) four business spaces (Hartley, 1994). Also as the Information Space is often the first step for companies that adopt the Internet, choosing firms from each of the other three spaces helped to further ensure that the firms selected were using the Internet in a sophisticated way.

As Lymer et al.'s (1997b) model, and the revised framework were designed to be useful for any industry, and validation of the model is built into the three stage testing process, strict industry guidelines were not considered necessary for the selection of the firms. Criterion five therefore is reflecting a desire for the research to potentially cover as broad a field as possible. Testing the models over several industries also helps with generalisability.

3.5.2 Contacting Firms

514 Canterbury based firms were identified using three Internet search engines.[5] Each Website was visited and classified in terms of Angehrn's (1997) four business spaces. After removing duplicate, non-suitable, and non-working links, 314 potential case study sites remained (Appendix D).

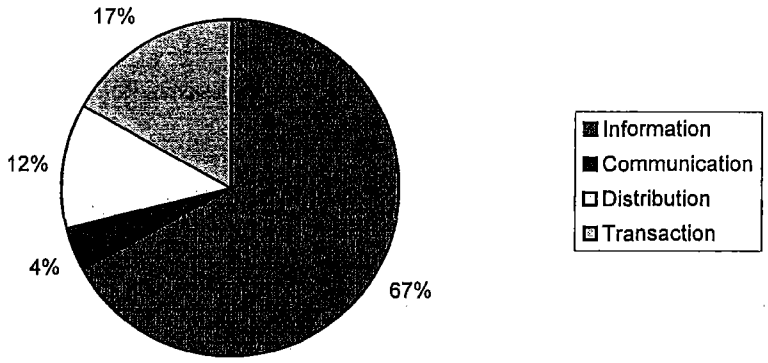
Figure 3-1 contains a breakdown of the percentage of firms in each of Angehrn's (1997) business spaces.[6] Simply providing information was by far the most common use of Websites, with 228 out of the 341 firms in this business space. There were very few Christchurch companies moving into Communication at the time of the Web search, and the Distribution and Transaction spaces also had low numbers. As awareness of the possibilities for the Internet increases, it is likely that the Information space will be subsumed by the other categories.

---

[5] http://www.yahoo.co.nz, http://www.searchnz.co.nz, http://www.canterbury.net

[6] Classification was based solely on the Website of the firm, so may not be an accurate representation.

Figure 3-1 Percentage of Firms in Each of Angehrn's (1997) Business Spaces



Four firms were selected, and contacted to see if they were willing to participate in the research. As Benbasat et al.(1987) suggest, contacts were told the amount of time, effort and expense required of them; and also the benefits that they would receive from the research. After initial contact, two firms proved unsuitable for inclusion in the study,[7] and one firm refused to participate. With that firm, Benbasat et al.'s advice was followed and contact was reinitiated with someone who had the authority to approve the study. Two other firms were chosen to replace the unsuitable firms.

After the interviews had been conducted it became apparent that Angehrn's (1997) ICDT framework was not an effective way of selecting firms. It was discovered that often internal uses of the Internet, which are not apparent from examining a company's Website, necessitated a reclassification of the firm's business space.

[7] One firm did not use the Internet internally; the other firm had their pages maintained by an outside company, and had no knowledge of or interest in the impacts of the Internet.

3.6 DATA COLLECTION

3.6.1 Pilot Study

A pilot study for this research was performed in 1997 (see Appendix E). The study was performed on a small manufacturer and distributor of sports and medical equipment. The pilot was helpful in several ways. Several follow-up phonecalls and e-mails, and one follow-up interview, helped to refine the interview instrument, as well as demonstrating the necessity of having a thorough case protocol and research instrument.

The pilot study was also useful as it provided the first chance to use Lymer et al.'s (1997b) model in a non-theoretical environment, and highlighted some issues with it that were addressed in the main study.

3.6.2 Yin's (1994) Three Principles of Data Collection

3.6.2.1 Use Multiple Sources of Evidence

Yin (1994) suggests that the opportunity to collect data from multiple sources is a major strength of case study research as it allows for data triangulation. In addition to the interviews and the questionnaire, documentation in the form of Web Pages, company profiles, Internet marketing strategies, and product information was retrieved from each site. Each recipient was also given the opportunity to comment on the initial analysis of impacts for each firm.

3.6.2.2 Create a Case Study Database

Yin (1994) considers it a weakness of case study research that often the final case report is not considered distinct from the evidence that it is based on. This lack of a formal case study database means that an independent researcher is not able check the conclusions if he or she is critical of the report.

For this research, files were created for each site visit which included all of the case data, contact information, transcripts and writeups of interviews, and other general notes. The research protocol (referred to in Section 3.6.3) was also part of the case study database, as

were the administered questionnaires, and copies of e-mail communications with the participants.

3.6.2.3 Maintain a Chain of Evidence

"A chain of evidence is necessary to increase the reliability of the information in a case study" (Yin, 1994, p. 98). There are three steps necessary to create an effective chain of research. 1) The report should make sufficient mention of the evidence for any conclusions drawn (for example, by referring to an interview); 2) the database should contain that evidence; 3) the evidence in the database should be consistent with the procedures in the case study protocol (for example, an interview should roughly adhere to the interview guide). Each of those steps has been followed in this research.

3.6.3 Case Study Protocol

The case study protocol is an essential part of a multiple case design (Yin, 1994). The protocol for this research consisted of: 1) an overview of the research, shown in Appendix B; 2) a listing of potential suitable and case study sites, reproduced in Appendix D; 3) copies of the research instruments (the interview guide, and the questionnaire), both reproduced in Appendix F; 4) a statement of the objectives and basic research design for this thesis, along with a copy of the model that was to be tested (Figure 2-5). The protocol was a vital part of the research, both in helping keep the researcher focused on the big picture, and in ensuring that the data was gathered from each site in a similar way (Zinatelli and Cavaye, 1992).

3.6.3.1 Research Instruments

Two research instruments were used in this study: a questionniare and an interview guide.

A modified version of Lederer et al.'s (1997) 30 item questionnaire on Impacts of information systems was administered either immediately after the interview or later, via e-mail. The instrument consists of 30 Internet impacts that the subject was asked to rate on a seven point likert scale. The impacts are based on data from Lederer et al.'s review of 178 empirical studies performed since 1978, and responses from the participants of his study. The impacts fall into five major categories, four of which can be easily mapped onto

Lymer et al.'s (1997b) impacts model for comparison and analysis between the two models.

The interviews were structured using Hart's (1991) three stage approach. First introductions were made; the interviewee was introduced to the purpose of the research, and asked if he[8] would approve the interview being recorded. Secondly basic demographic questions were asked about the company. This stage was used to help put the interviewee on certain ground and to make him feel at ease. The third stage "began the interview proper" (Hart, 1991, p.194), and consisted of semi structured, open ended questions.

The interview guide was constructed using frameworks and types of impacts from the literature. Initial (stage 2) questions were highly structured and aimed at collecting factual data about the organisation and its products. Later questions were semi-structured, consisting mostly of open ended questions designed to 1) build a larger picture of the organisation; and 2) determine the types of impacts that the Internet has made on the organisation. After each interview had been transcribed and written up, the guide was refined to reflect any new information or areas of interest that may have emerged.

3.6.4 Multiple Collection Methods

Benbasat et al. (1987) state that a "clear description of data sources and the way they contribute to the findings of the research is an important aspect of the reliability and validity of the findings" (p. 381). Multiple collection methods also enable comparison and thus reduce the potential for bias (Benbasat et al., 1987; McKinnon, 1988).

Several data sources and methods for collection were employed in this research. The majority of the data was collected through an interview with either the managing director of each firm, or a top level employee who was highly involved with the use of the Internet in the company. Two interviewers were present in three of the four interviews, and as Eisenhardt (1989) suggests, employing investigator triangulation through having multiple researchers present did add to the richness of the analysis, as each researcher had different perceptions of the data.

Each interview was taped with the interviewee's permission, and later transcribed (Patton, 1980[9]). The accuracy of the transcripts was checked by reading them while listening to the interview a third time. Notes were also taken at the interviews, and initial impressions of the case, and the impacts were recorded as soon as the sessions ended.

Lederer et al.'s (1997) questionnaire was also administered to each participant. In one site Lederer et al.'s questionnaire was administered to two employees, thus creating an extra form of data triangulation.

As referred to in Section 3.6.2.1 various documents were also collected from each firm. Such quantitative data helped to improve confidence in the analysis. By using multiple collection methods it was possible for example to check an interviewee's feeling about increased hits to the site, against data from the hit counters on the site which had been collected over a period of time.

3.7 DATA ANALYSIS

There is much literature on qualitative data analysis that laments the lack of literature on qualitative data analysis (Eisenhardt, 1989; Hartley, 1994; King, 1994). Generally methods for analysing interview data are not reported. Several researchers have commented that as this means there is little advice for newcomers to the field, inevitably the validity of qualitatively derived findings must be considered shaky (LeCompte and Goetz, 1982). Eisenhardt (1991) contends that two things are needed to create good theory: 1) multiple cases that permit replication and extension among individual cases. 2) methodological rigour. It is difficult to achieve rigour where, unlike many quantitative methods, there are no formal rules for analysis in case studies. In case studies "a huge chasm often separates data from conclusions" (Eisenhardt, 1989, p. 539).

Some authors have given guidelines as to how cases should be analysed (Eisenhardt, 1989; Hart, 1991; Hartley, 1994; King, 1994; Miles and Huberman, 1994; Yin, 1994; Marshall

---

[8] All interviewees in this research were male

[9] Cited in Hart (1991).

and Rossman, 1995). These guidelines were adopted for this research. Especially useful for this research were Miles and Huberman's (1994) 13 tactics for generating meaning, and their 13 tactics for confirming findings.

3.7.1 Within-case Analysis

> *Within case analysis typically involves detailed case study write-ups for each site. These write-ups are often simply pure descriptions, but they are central to the generation of insight because they help researchers to cope in the early analysis process with the often enormous volume of data (Eisenhardt, 1989, p. 540).*

An important principle is that data collection and analysis should not be treated as separate phases, but they should occur concurrently (Eisenhardt, 1989). The ideal is to learn from each site visit before proceeding to the next one. This has the desirable effect of maximising the return from effort. Each case was transcribed, written up, and analysed before proceeding to the next case. This reduced the danger of the results being influenced by unusual or interesting data (Hartley, 1994; Miles and Huberman, 1994). As data had been collected from multiple sources, this acted as a cross validation of the results.

To analyse the case data, techniques from Eisenhardt (1989), Miles and Huberman (1994) and Yin (1994) were used. From the case writeups, major impacts were extracted, and clustered into categories. The categories generated were useful later on when testing and refining Lymer et al.'s (1997b) model. After the categories had been generated, the individual impacts were mapped onto Lymer et al.'s model. Results and discussion for this step is contained in Chapter Five.

3.7.2 Cross-case Analysis

> *The idea behind cross-case searching tactics is to force investigators to go beyond initial impressions. These tactics improve the likelihood of accurate and reliable theory, and enhance the probability that the investigators will capture the novel findings which may exist in the data (Eisenhardt, 1989, p. 541).*

Lymer et al.'s (1997b) impacts model was designed to be used for cross-business comparison, and the model, along with the generated clusters from the impacts of the Internet on each case were invaluable tools for the cross-case analysis. The impacts model helped to display each case on common dimensions, and the generated clusters were helpful when undertaking further pattern matching analysis.

Miles and Huberman's (1994) suggestions for noting patterns and themes, and making contrasts and comparisons were also useful.

3.7.3 Analysis of Model

Lymer et al.'s (1997b) model was tested and analysed in several ways. The observed impacts from the literature were mapped onto Lymer et al.'s model to see if it could cope. Impacts from each within case analysis were mapped onto the model for the same reason. The generated clusters from each case were also compared with Lymer et al., to determine if the model required revising or extending. The data from Lederer et al.'s (1997) instrument was analysed and used in the same way. The process of redesigning Lymer et al.'s model is described in Chapter Six.

3.8 VALIDITY AND RELIABILITY

Four tests can be used to judge the quality of case study research: 1) construct validity 2) internal validity; 3) external validity; 4) reliability (Yin, 1994). Steps taken to ensure the validity and reliability of this research have been described above. This section presents a brief review of those steps.

3.8.1 Construct Validity

> *Construct validity consists of establishing correct operational measures for the concepts being studied (Yin, 1994).*

Construct validity was achieved through using multiple sources of evidence, by ensuring that there was a chain of evidence, using multiple research and collection methods, through checking the model against the literature, and by asking participants to review the research findings.

3.8.2 Internal Validity

> *Internal validity involves establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships (Yin, 1994).*

Internal validity was achieved through combining qualitative and quantitative research methods (Gable, 1994), and comparing Lymer et al.'s (1997b) model against the Internet impacts literature (Eisenhardt, 1989).

3.8.3 External Validity

> *External validity consists of establishing the domain to which a study's findings can be generalised (Yin, 1994).*

External validity was established through the literal replication of Lymer et al.'s (1997b) model to multiple cases. Yin (1994) states that replication of findings is necessary for the external validity of the research, i.e. whether the results are generalisable beyond the immediate case study. Testing Lymer et al.'s model with another instrument measuring the same traits also enhanced the external validity of the study, as did selecting firms from within different business spaces and different industries.

3.8.4 Reliability

> *Reliability consists of demonstrating that the operations of a study - such as the data collection procedures can be repeated, with the same results (Yin, 1994).*

To ensure reliability, a case study protocol, and a case study database were developed. These steps have been fully explained in Sections 3.6.2.2 and 3.6.3.

3.9 CONCLUSION

This chapter described the goals, research methods, data collection approaches, and analysis techniques of this study. Particular attention was paid to ensuring that Benbasat et al.'s (1987) concerns about empirical case study research were addressed, as well as Yin's (1994) recommendations for valid and reliable case research.

4. LITERATURE DISCUSSION AND ANALYSIS

4.1 INTRODUCTION

This chapter forms phase one of the research, where the objective was to review the literature to determine impacts of the Internet, and to compare various frameworks with Lymer et al's Internet impacts model.

Lederer et al.'s (1997) instrument is first introduced, and the feasibility of comparing it with Lymer et al.'s (1997b) model is discussed. Lymer et al.'s model is then compared with other frameworks that deal with Internet or IS impact or effectiveness. Some tentative conclusions are drawn at this stage which are discussed further in Chapter Six.

The remainder of the chapter deals with mapping 120 Internet or IS impacts onto Lymer et al.'s (1997b) model and discusses issues with the model that are uncovered during this process.

4.2 LEDERER ET AL.'S (1997) INSTRUMENT

Lederer and Mirani (1995) performed a literature review to determine what they considered to be a comprehensive list of 33 benefits of information systems. After pilot tests which resulted in the deletion or inclusion of new impacts, they performed a survey on 200 firms, asking each firm to rate the importance of each impact between one and seven. Factor analysis on the results revealed five distinct categories with multiple impacts: improved information, strategic advantage, reduced technology cost, better applications development, reduced workforce costs. Four other factors were identified that only had one impact: return on investment, reduced travel costs, adherence to government regulations, business redesign.

Using the comprehensive list of information systems benefits obtained from Lederer and Mirani's (1995) study, Lederer et al. (1997) took the previous study further, performing a survey with 212 companies to determine whether a company's anticipated benefits from

Internet marketing could predict which of Porter's (1980) three business strategies - cost leadership, differentiation, or focus - the company employed. Part of the survey instrument asked respondents to rate the importance of each benefit on a 1-7 Likert scale. Space was also given for the respondents to include a benefit and rating that was not on the original list. Factor analysis yielded different results to the previous study and predicted six distinct categories of impact: information, cost savings, competitivenes, productivity, planning and control, and new applications (Table 4-1).

Table 4-1 Lederer et al.'s (1997) Categories of Impact

Lederer et al. (1997) Internet Impacts Instrument		
Competitiveness (C)	1	enhance competitiveness or create strategic advantage
	2	provide new products or services to customers
	3	enhance credibility and prestige of organisation
	4	provide better products or services to customers
	5	change the way the organisation conducts business
Information (I)	1	enable easier access to information
	2	increase the flexibility of information requests
	3	improve customer relations
	4	increase volume of information output
	5	enable the organisation to respond more quickly to change
	6	enable faster retrieval or delivery of information or reports
	7	improve accuracy or reliability of information
	8	present information in a more concise manner or better format
New Applications (N)	1	allow previously infeasible applications to be implemented
	2	allow other applications to be developed faster
Productivity (P)	1	align well with stated organisational goals
	2	increase return on financial assets
	3	enhance employee productivity or business efficiency
	4	speed up transactions or shorten business cycles
	5	provide the ability to perform maintenance faster
Planning and Control (PC)	1	help establish useful linkages with other organisations
	2	enable the organisation to catch up with competitors
	3	improve management information for strategic planning
	4	improve information for management control
Cost Savings (S)	1	save money by reducing communications costs
	2	save money by avoiding the need to increase the workforce
	3	save money by reducing travel costs
	4	save money by reducing the work force
	5	save money by reducing hardware cost

Lederer et al.'s (1997) questionnaire was used in the analysis phase of this research. It was useful to identify the delivered impacts of the Internet (Lederer and Mirani, 1995), and, when used in conjunction with Lymer et al.'s (1997b) model it was useful to increase the

understanding of the impact of the Internet on firms. The case results for Lederer et al.'s model are discussed in Chapter Five.

4.2.1 Matching Lederer et al.'s (1997) Instrument to Lymer et al.'s (1997b) Model of Impacts

As Lederer et al.'s (1997) model is used to check the validity of Lymer et al.'s (1997b) model it is necessary that the two models assess similar traits. Figure 4-1 shows the results from mapping each impact from Lederer et al.'s six categories onto Lymer et al.'s Internet impacts matrix.

Figure 4-1 Mapping Lederer et al. (1997) to Lymer et al. (1997b)

Matrix Model of Internet Impacts Lymer et al. (1997b)			Levels of Impacts			
			External		Internal	
			Business Contacts	Industry	Organisation	Task
Categories of Impact	Input	Communication (2 way)	I2 I5			S1
		Information Retrieval (1 way)	I2 I3	I2	I1 I4 I5 I8	I6 I7
	Output	Knowledge Management	C4	C2	N2 N1 PC3 PC4	
		Productivity (Use of Knowledge)	S3		P2 P3 P5 S2 S4 S5	P2 P4
		Environment (Context of Impact)	C3 I3	C3 PC1 PC2	P1 C1 C5	

Lederer et al.'s (1997) information category maps almost exactly onto Lymer et al.'s (1997b) categories of *communication* and *information retrieval.* The only anomaly is impact I3 - improve customer relations - which maps to Lymer et al.'s *environment* category.

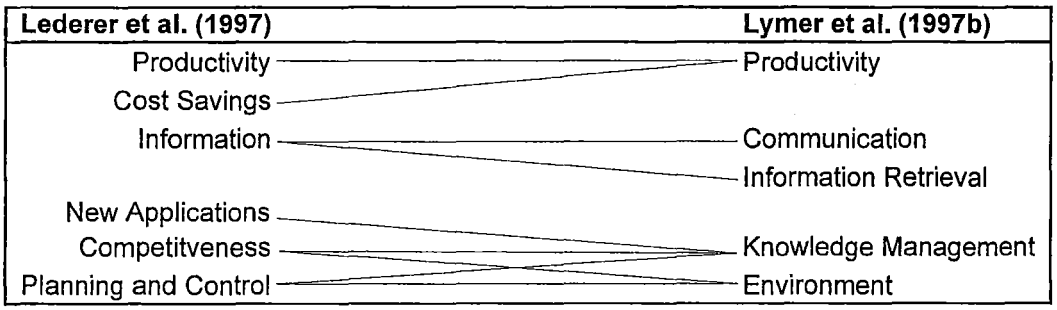
In addition to information impacts from Lederer et al.'s (1997) model, Lymer et al.'s (1997b) *communication* category includes one savings impact, S1 save money by reducing communications costs. This should be taken into account when making any comparisons or drawing any conclusions between the two models.

The other categories of both Lederer et al. (1997) and Lymer et al.'s (1997b) models are more problematic. Lederer et al.'s competitive impacts are spread over Lymer et al.'s *knowledge management* (two impacts) and *environment* (three impacts) categories. *Knowledge management* also totally subsumes Lederer et al.'s new applications category, and includes two of the four impacts from planning and control.

Lymer et al.'s (1997b) *productivity* category consists entirely of productivity and cost savings impacts from Lederer et al.'s (1997) instrument, with one impact from each of these categories (S2 and P1) being covered elsewhere in Lymer et al.'s model.

Lymer et al.'s (1997b) *environment* category includes four out of Lederer et al.'s (1997) six types of impact: competitiveness (three impacts), planning and control (two impacts), and one impact each from productivity and information. Planning and control is the only category in Lederer et al.'s instrument that does not mostly map onto one of Lymer et al.'s categories, with an equal number of impacts in both *knowledge management* and *environment*.

Figure 4-2 Mapping Between Lederer et al. (1997) and Lymer et al. (1997b)



In general although the models are not a perfect fit, comparison of the results from each model is certainly feasible, and useful, when the above issues and differences are taken into account (see Figure 4-2 for a representation of the mappings). Such a comparison is performed with case data in Chapter Five. It must also be recognised that Lederer et al.'s (1997) categories are merely the result of trying to find names for groupings that factor analysis had uncovered. In Lederer et al.'s study there was often a good case for putting one type of impact into one of several categories (Lederer et al., 1997). It may also be telling that the same impacts were used in each of Lederer et al.'s two studies, but

significantly different categories were generated. This may be an indication that the factors are unstable.

Thus it may not be useful to make judgments about Lymer et al.'s (1997b) model because the categories do not correspond exactly with similarly named categories in Lederer et al.'s (1997) model. In the next section Lymer et al.'s model is compared with frameworks of impacts and effectiveness that have been discovered in the literature.

4.3 RELATING OTHER FRAMEWORKS TO LYMER ET AL.'S (1997B) MODEL

A literature review uncovered seventeen studies that propose frameworks for analysing IS impact or effectiveness. Each of these frameworks is described in Appendix G. Although none of the studies address the issue of small firms directly it is useful to compare the frameworks to Lymer et al's (1997b) model. Some of the frameworks utilise the same, or similar categories as Lymer et al. (1997b) to describe impacts. However there are many categories that either have to be stretched to fit into one of Lymer et al.'s categories, or don't fit into any of Lymer et al.'s categories at all. These frameworks are discussed in this section, and conclusions about Lymer et al.'s model are drawn in Chapter Six.

Porter (1980) covers Lymer et al.'s (1997b) external levels of impacts but splits the categories into competitors, suppliers and buyers, rather than Lymer et al.'s *business contacts* and *industry* definitions. Gable (1994) also draws a distinction between customer and supplier relations, as do Abell and Black (1997) and Tallon et al. (1997). Cronin (1995), Rao et al. (1995), and Sterne (1995) all differentiate between customers and business partners. In their strategic thrusts model Rackoff et al. (1985) deal with all three categories: suppliers, customers, competitors. As Lymer et al.'s categorisation is not consistent with these other models, it may be appropriate to split Lymer et al.'s *industry* level into suppliers, and competitors/business partners, and change the *business contacts* level to customers, to keep in line with the other literature in the field.

Although only a few of the models refer to Lymer et al.'s (1997b) internal levels of impact by name (Gable, 1994; Cronin, 1995; Ellsworth and Ellsworth, 1996), all of the models

deal in some way with impacts at the *organisation* level, and many deal with impacts at the *task* level (Farbey et al., 1992; Lucas and Olson, 1994; Sterne, 1995; Abell and Black, 1997), although generally a distinction is not made between the two. Having two levels of internal impact may be unnecessary.

Several frameworks include *communication* impacts (Farbey et al., 1992; Sterne, 1995; Ellsworth and Ellsworth, 1996; Abell and Black, 1997), but only two include *information retrieval* impacts (Ellsworth and Ellsworth, 1996; Abell and Black, 1997). Many models included *communication* and *information impacts* indirectly through categories such as improved relationships, or the establishment of new market linkages (Chan and Huff, 1993; Sterne, 1995; Bloch et al., 1996; Abell and Black, 1997; Ghorab, 1997; Tallon et al., 1997).

Lymer et al.'s (1997b) *knowledge management, productivity, and environment* impacts categories present more difficulties when trying to compare them to existing frameworks. For example Lymer et al.'s *productivity* category is very broadly and quite ambiguously defined. While most studies tend to equate productivity with efficiency (Farbey et al., 1992; Chan and Huff, 1993; Gable, 1994; Lucas and Olson, 1994; Cronin, 1995; Rao et al., 1995; Ellsworth and Ellsworth, 1996; Tallon et al., 1997), Lymer et al.'s *productivity* category can potentially be extended to subsume categories such as revenue generation (Grover et al., 1994; Ellsworth and Ellsworth, 1996; Ghorab, 1997) costs savings (Rackoff et al. 1985; Cronin, 1995; Sterne, 1995; Bloch et al., 1996; Ghorab, 1997), and reach (Rackoff et al., 1985; Chan and Huff, 1993; Lucas and Olson, 1994; Cronin, 1995; Sterne, 1995; Bloch et al. 1996; Ellsworth and Ellsworth, 1996).

The scope of Lymer et al.'s (1997b) *knowledge management* category is even more indeterminate. Lymer et al. intended it to cover the development of expertise, education impacts, and other innovative things that companies could do with the Web (Lymer et al., 1997b). It would seem to subsume impact categories such as management effectiveness (Chan and Huff, 1993; Farbey et al., 1992; Ghorab, 1997; Tallon et al., 1997) and new or better products and services (Rackoff et al., 1985; Chan and Huff, 1993; Grover et al., 1994; Cronin, 1995; Rao et al., 1995; Bloch et al., 1996; Abell and Black, 1997; Ghorab, 1997; Tallon et al., 1997).

It is similarly difficult to find support for Lymer et al.'s (1997b) final category, *environment*, in the literature. Lymer et al.'s definition includes changes to the physical office and culture of the firm, changes to human relationships, strategy and technical impacts (Lymer et al., 1997b). This definition is wide enough to cover many of the categories from frameworks that have not yet been dealt with, including competitiveness (Porter and Millar, 1985; Farbey et al., 1992; Chan and Huff, 1993; Gable, 1994; Ellsworth and Ellsworth, 1996; Ghorab, 1997), improved image (Sterne, 1995; Bloch et al., 1996), and nature of work (Lucas and Olson, 1994).

Prima facie it may be concluded that Lymer et al.'s (1997b) model needs revising to bring it more into line with other frameworks of impacts and effectiveness. Especially problematic are Lymer et al.'s three categories of *productivity, knowledge management,* and *environment*, the definitions of which are so broad and ambiguous as to be of little use to the researcher or the practitioner. These categories may have to be replaced or redefined; this is discussed further in Chapter Six.

4.4 APPLYING LITERATURE IMPACTS TO LYMER ET AL.'S (1997B) MODEL

120 observed impacts from the Internet and other information systems were discovered from empirical studies in the literature (Table 4-2). These impacts were mapped onto Lymer et al.'s (1997b) model (Figure 4-3) to determine whether a fit could be made with them all, and to gain insights into the utility of the model for this kind of task

Table 4-2 Observed Impacts from the Literature

Kwon and Zmud (1987)
A1 improved relative advantage A2 cosmopolitanism A3 increased autonomy
Huber (1990)
B1 decentralisation
Benjamin and Levinson (1993)
C1 improved relative advantage C2 decentralisation C3 information shifts from managers to online sources C4 speed up in process cycles
Duchessi et al. (1993)
D1 change in work methods - collaborative efforts
Fried (1993)
E1 productivity increases when combined with organisational and process changes E2 personnel shifts and downsizing E3 expansion into new business areas E4 transforming skills of staff E5 meeting need for real time management information E6 providing tools that permit users to meet their own information needs E7 tools that enhance communication
Atkins (1994)
F1 tools that reduce the need to travel F2 creating new applications that enhance the competitive stance of an organisation
Farbey et al. (1994)
G1 enabling the reduction of costs G2 enabling customer intimacy G3 20% reduction in professional time G4 reduction in paper G5 better information to the customer G6 improved presentational quality G7 getting product to the market sooner G8 enhanced customer services G9 promoted the exchange of management information G10 consistency of company style

Table 4-2 (continued) Observed Impacts from the Literature

Lucas and Olson (1994)
H1 took organisation further along the it learning curve H2 improved job satisfaction for consultants and secretaries H3 enables the firm to respond quickly to changing market conditions H4 organisation becomes dependent on it H5 use of internet stimulates unanticipated responses from competitors and other affected groups H6 faced with managing greater complexity H7 better customer service - booking system available to individuals H8 direct revenue generation H9 less flexibility for industry H10 possible increase in market volatility
Venkatraman (1994)
I1 transformation of structure of airlines and their information services organisations I2 affects nature and pace of work - most often speeds up processing of information I3 increase productivity
Poon and Swatman (1995)
J1 reduce costs J2 facilitate flexibility J3 changes in costs J4 increased informal networking J5 increased autonomy J6 improved relative advantage J7 virtual alliances, generating new sources of wealth J8 exchange design specs by sharing a common repository J9 allow groupware applications between firms J10 expertise through video conferencing J11 allow customers to order products through site J12 allow customers to interact with each other through chat rooms J13 using internet fax services for cheaper document exchange J14 search for potential business partners
Rao et al. (1995)
K1 login to remote system and use specific application K2 company can deal with multiple business partners without using different proprietary systems
Sterne (1995)
L1 better relationship between trading partners L2 product and service differentiation L3 improved corporate image L4 improved customer and investor relations L5 finding new customers L6 increased visibility L7 cost reduction

Table 4-2 (continued) Observed Impacts from the Literature

Lee and Clark (1996)
M1 market expansion M2 improved internal communications
Bennet (1997)
N1 bypass brokers N2 create barriers to imitation, give competitive advantage N3 helps with export marketing research N4 helps the firm sell anywhere in the world N5 lowers the cost of international marketing N6 creates a good business image N7 avoids having to set up foreign branches N8 makes exporting easier N9 avoids having to bother about foreign cultures and business practices N10 helps penetrate unfamiliar foreign markets N11 helps introduce new products N12 avoids having to obtain foreign representation N13 creates sales leads N14 generates international awareness of the business N15 makes it easy for foreign customers to order goods N16 gives the firm a competitive edge over rivals N17 creates ongoing relationships with customers
Carlson et al. (1997)
O1 stimulates secondary markets O2 generates useful feedback from customers
Lymer et al. (1997a)
P1 less need to return to the office for paperwork related activities P2 increase in effective use of worktime P3 sales to new clients - expansion of customer base P4 productivity - more time in front of computer P5 use of usenet and maintaining mailing lists - generates repeat visits P6 email communication with customers that would otherwise not be reached P7 able to receive feedback from customers P8 improved communication with suppliers and competitors P9 offering members better quality service by keeping them up to date P10 educating customers P11 time and money training staff

Table 4-2 (continued) Observed Impacts from the Literature

O'Connor et al. (1997)
Q1 greater understanding of how to run and maintain a website Q2 increase in responsiveness improves image of business Q3 using web to find trading partners, wholesales and retail Q4 increased sales Q5 becoming known worldwide Q6 ability to extend the market reach of small company Q7 international orders that otherwise would not have been received Q8 more control over the distribution and marketing of products Q9 wholesalers perturbed because company now competing with them Q10 strained relationships due to distribution channels being shortened Q11 having to learn new tasks esp managing and maintaining a web site
Philip and Pederson (1997)
R1 hadn't planned on taking own orders. Now have to set up a complete order taking system R2 enables interactivity with customers - builds rapport R3 enables a faster trading cycle R4 enhanced competitiveness through win-win partnerships R5 increased productivity R6 improved customer service R7 faster communication between trading partners leading to reduced inventory R8 improved accuracy of information and error reduction by eliminating the need to re-key data R9 reduced operating costs R10 high initial cost R11 high volume of transactions needed before benefits obtained R12 changes in organisational structure R13 company must think about security and legal issues

Figure 4-3 Mapping Literature Impacts to Lymer et al.'s (1997b) Model

Matrix Model of Internet Impacts (Lymer (1997))			Levels of Impacts				
			External		Internal		
			Business Contacts	Industry	Organisation	Task	
Categories of Impact	Input	Communication (2 way)	G2 J4 J13 L4 N17 O2 P6 P7 R2 R6	G9 J14 L1 P8 R7	E7 G4	M2 P5	19
		Information Retrieval (1 way)	G5 H7 P9	J8 J9 J10 N3 Q3	G6		9
	Output	Knowledge Management	G8 J12 P10	E3 K1 L2	E4 E5 H1 N11 Q8	E6 Q1 Q11	14
		Productivity (Use of Knowledge)	F1 J11 L5 L6 M1 N4 N13 N14 P3 Q4 Q5 Q6 Q7	H3 N5 N10	E1 G1 G7 H8 J1 J3 L7 R3 R10 R11	C4 G3 I2 I3 P1 P2 P4 P11 R1 R5 R8 R9	38
		Environment (Context of Impact)	L3 N6 Q2	A1 C1 F2 H5 H9 H10 J6 K2 N2 N16 R4	B1 C2 D1 E2 G10 H4 H6 I1 J2 R12		24
			32	27	28	17	104

4.4.1 Lymer et al.'s (1997b) Levels of Impact

57% of the impacts from the literature were observed at the external level, these were fairly evenly distributed between *business contacts* and *industry*. Many of the impacts were difficult to categorise into either category, for example impact J14 "search for potential business partners" could validly be mapped under either category. This ambiguity of scope is perhaps best addressed, as discussed in Section 4.3, by splitting the external level into three categories; changing *business contacts* to "customers", and replacing *industry* with suppliers, and business partners / competitors.

At the *business contacts* level, *productivity* and *communication* are the most heavily impacted categories, *productivity* at this level showing the most impacts of any cell in the model. As alluded to in Section 4.3 this is most likely due to the fact that the category subsumes many impacts that could reasonably be classified as categories in their own right. Reach and range impacts are especially evident in this cell.

At the *industry* level most impacts from the literature fell into the *environment* category. This category subsumes other types of impacts also, mainly to do with competitiveness. With these types of impacts it would be especially useful for firms to be able to see at a

glance which external entities, customers, suppliers, or competitors, their strategies are affecting. The term *industry* is too vague to be of significant value to the analyst.

43% of the impacts were at the internal level, with the majority of these being classified under *organisation*. The bulk of the *organisation* impacts fell into the *productivity* and *environment* categories, each having significantly more impacts than the other three categories. Again this is probably due to the wide scope of these categories. Cost savings, and sales were quite evident impacts, at the *organisation* level, as well as efficiency impacts, and these all fell under the heading of *productivity*.

Impacts at the *task* level were very few, with the exception of the *productivity* cell. Almost all of the impacts there dealt with staff being able to use their time more efficiently. As the other categories of impact were hardly felt at the task level, it may be that Internal impacts could constitute a category in itself, rather than being split into two.

4.4.2 Lymer et al.'s (1997b) Categories of Impact

Communication was the third most impacted category behind *productivity* and *environment*. Fifteen of the nineteen impacts were classified at the external level, the majority of these under *business contacts*. The *communication* category also includes cost savings impacts related to communication, and impacts such as improved relationships due to more effective communication methods. This is a potential area for discussion; those impacts could possibly be categorised under different headings, for example "cost savings".

As *information retrieval* impacts are not highly evident, it may be advantageous to combine the two input categories, into one category that would include the dissemination and exchange of information.

Knowledge management shows only limited impacts from the literature. This is surprising given the scope of the category (discussed in Section 4.3) but may be due to the fact that many of the impacts come from studies that are now several years old. It is proposed that companies in 1998 may be using the Internet for more sophisticated tasks, rather than for the mainly productivity and information benefits that they sought in the past (Poon and Swatman, 1995).

Productivity impacts were the most evident in the literature, comprising 37 of the 104 impacts. These were evenly spread over three of the four levels, with *industry* not being impacted so heavily. The magnitude of impacts in this category is due to the wide and ambiguous scope of the category. Many impacts are to do with cost or reach, rather than purely productivity. Splitting this category into several smaller ones would enhance the usability, and usefulness of the model.

Environment had a large number of impacts but almost all were focused at the *industry* level, where they were mainly competitive impacts, and at the *organisation* level, where the impacts were mainly culture changes within the company. This category should also be redefined to make it clearer which impacts fall into its scope.

4.4.3 Other Impacts

Sixteen of the 120 impacts uncovered in the literature could not be classified in terms of Lymer et al.'s (1997b) model (see Appendix H for list). Many of these impacts came from Bennet's (1997) study which dealt with the specifics of setting up export divisions in foreign markets and may not be relevant to many firms. Other impacts had to do with threats, or strained relationships. These issues should be dealt with in a revised model.

4.5 CONCLUSION

This chapter has discussed various frameworks of impact with respect to Lymer et al.'s (1997b) model, and put forward suggestions for alteration to the framework that will be analysed further in Chapter Six. 104 out of 120 impacts from the literature were mapped onto Lymer et al.'s model and further suggestions for enhancement of the model were propounded.

Of particular concern was the ambiguity of the external levels of impact in the model; *business contacts* and *industry*, and the wide scope of several categories in the model, most notably *productivity, knowledge management,* and *environment.*

The next chapter deals with phase two of the research, mapping data from case studies onto Lymer et al.'s (1997b) model and discussing the results. Suggestions from Chapters Four

and Five are then consolidated, and a revised model of Internet impacts is suggested in Chapter Six.

5. CASE DISCUSSION AND ANALYSIS

5.1 INTRODUCTION

This chapter completes phases two and three of the research; a theoretical replication of Lymer et al's (1997b) study, and the application of Lederer et al.'s (1997) framework. The chapter discusses the impacts of the Internet on each of the four firms, and compares the results obtained, by utilising the two major instruments of this study, Lymer et al. (1997b) and Lederer et al. (1997).

First the major impacts are extracted from each interview. It was discovered during the pilot study that dealing only with the major impacts reduces the confusion and clutter of Lymer et al.'s (1997b) model. Quotes from the interviews are given to justify the impacts, then they are mapped onto Lymer et al.'s Internet Impacts Model and discussed. At the same time, the results from Lederer et al.'s (1997) instrument are analysed and compared with the results from Lymer et al.'s model.

At each stage difficulties or issues with the models are briefly discussed but a more focused analysis is conducted in Chapter Six, which draws together the issues raised in this and the preceding chapter.

This chapter is concluded with a cross-case discussion of the impacts of the Internet on the firms.

5.2 CASE 1: TOURISM

5.2.1 Overview[10]

The company in Case 1 is a Christchurch based subsidiary to a German travel company. The firm specialises in providing customers, who wish to travel to New Zealand, with a

---

10 Full write-ups for each case are presented in Appendix I.

flexible and complete tour package. The company consists of two directors in Christchurch, and several tour guides around New Zealand; a total of six employees.

The company has been on the Internet since 1996. The impacts as a result of this have been vast, mainly due to the reach the Internet provides. It has also allowed the company to offer a much wider range of information and services to its customers than would otherwise be possible.

Future plans for the Internet include reselling of Web-space and more collaboration with its competitors in the market to ensure the customer gets the best information and level of service possible.

5.2.2 Impacts Derived From the Interview

Only the major impacts were extracted from the data gained from each company. Each impact was initially sourced from the write-ups of the interviews carried out with each firm (see Appendix I). The impacts were compared with those gleaned by the second Interviewer. The write-ups and impacts were also given to a third party as a further check that the major impacts had been extracted. Finally the list of impacts were sent to each firm for confirmation, rebuttal, or clarification. This process was designed to ensure the integrity and internal validity of the results through several methods of triangulation.

5.2.2.1 Increased Visibility Leading to Massive Increase in Customer Growth

The major impact the Internet has had on the company in Case 1 is allowing it to target previously unattainable markets. The company has gone from having brochures printed only in German, to utilising the Internet as a marketing platform that effectively targets customers worldwide. In 1996 the business had one customer. After implementation of the Internet, this figure increased to 100 customers in 1997.

> *The Internet is the best thing. It is a good way to promote your product, especially for small companies which do not have the resources and distribution channels that the larger companies have.*[11]

[11] All quotes from the interviewees are presented in italics.

The growth rate is phenomenal, and you don't have to have brochures. The thing is working 24 hours for you, you sleep, it's working!

5.2.2.2 Reduction in Paper and Mailing Costs

Now that most of their business comes from the Web, the company in Case 1 has cut down on producing and distributing brochures and information to potential clients in its German speaking markets. It is more effective to just direct them to the Website.

Our brochures take us seven months to write and hundreds of dollars to mail. In Germany the success rate is only 3-5%.

We spend thousands [of dollars] for brochures etc. then find that it doesn't work. With the Internet you can just start somewhere and build it. In the long term the Internet is much less expensive.

5.2.2.3 Collaboration with Competitors for their Clients' Benefit

The company in Case 1 believes that the most important aspect of their business is providing an efficient client service. Their focus is on ensuring that each client has the holiday experience of their life, and providing the client with the best possible source of information about New Zealand by collaborating with other travel services is one way to achieve that goal.

We want to make sure that people get accurate information. There is so much information that we can't provide on our page, so the best solution is to link to other sites with Agent pages so we can provide the customer with the best and widest range of information.

At the end of the day what do we want? We want to provide a customer service. I think it is very narrow minded to say [to competitors], I won't let you go to my site. If people can see all the things available in New Zealand they may stay longer.

We don't do it for the money, we do it for the pleasure of organising. Of course the money is important...

5.2.2.4 Shortsightedness of Their Suppliers is Limiting Further Expansion

This impact is also a threat for the company. Many of the suppliers that the company deals with don't comprehend the potential benefits of the Internet for their businesses, and don't wish the company to create a site for them. Currently, hosting pages for the various hotels, rental car companies, and tourist services is actually costing the company money. Also many of the larger businesses (like the airlines) aren't willing to share information, so the company must recreate that information on its pages.

They have a page, now they're thinking the world is coming to me. But is just doesn't happen like that. They don't realise the hours we spend on search engine updates, Usenet, discussion lists...

Many of the larger companies are not really into sharing information with smaller companies at the moment.

5.2.2.5 Faster and More Effective Communications with Clients

E-mail is a faster and cheaper way for the company in Case 1 to deal with many of their clients. Also the Website gives potential customers a source of information about the company, its services, and also about New Zealand.

It is easier for some clients to write an e-mail rather than call us long distance from America or wherever.

We have tried to make the Website as comprehensive as possible, people want the best information to make their decisions on.

5.2.2.6 Learning New Skills - Website Maintenance

Maintaining their own Website not only enables updates to be executed faster, it also saves the company paying their Web designers to do simple things.

I have done Webpage courses and can update the site myself. I believe in any operation, you should have knowledge about it. It makes maintenance a lot quicker, and we don't have to pay some company $75 per hour.

5.2.2.7 Time Spent Updating Pages

The drawbacks of maintaining the site internally include the time spent on updating all of the different prices for clients. Re-keying errors are also common as currently each price has to be input to three or four different files.

There are so many different prices, it is very hard to keep track of them. The Web page is about 250 pages, it is a very long process to update it.

We are developing a software package where we are integrating the booking software with the HTML. This will mean we only have to update once. At the moment we have to update three or four different files instead of just one.

5.2.3 Application of Lymer et al.'s (1997b) Model

Each of the impacts listed above have been mapped onto Lymer et al.'s (1997b) Internet impacts model (Figure 5-1).

Figure 5-1 Mapping Case 1 to Lymer et al.'s (1997b) Model

Matrix Model of Internet Impacts Lymer (1997)			Levels of Impacts			
			External		Internal	
			Business Contacts	Industry	Organisation	Task
Categories of Impact	Input	Communication (2 way)	Faster and more effective communication with customers			
		Information Retrieval (1 way)	GINZ collaborates with competitors to provide a wide range of information for customers.			
	Output	Knowledge Management				New skills - Web maintenance
		Productivity (Use of Knowledge)	Increased visibility leading to increase in client base	Collaboration with competitors for clients' benefit Short sightedness of suppliers limiting expansion	Reduction in paper and mailing costs	Time spent updating Website
		Environment (Context of Impact)				

The model shows major impacts over a broad range, from *task* based through to *business contacts*, however they were mainly focused in the *productivity* category. A discussion of the categories of impact follows.

5.2.3.1 Communication

As the company is so small, e-mail does not play a part in the internal operations of the company. The only impacts here are do with communications with customers. As more of the company's suppliers and competitors come online, communications should have an effect on the industry level also.

5.2.3.2 Information Retrieval

The company does not currently use the Web for any type of research or information retrieval "*I am a book person. I would rather go to the library*". This is certainly a weakness that could be addressed.

Externally the impacts are greater. The web site is used mainly as a source of information for clients and potential clients. Opportunities exist for the company to take greater advantage of the information provided online (but not to the company itself) by many of their large suppliers such as the airlines and the major car rental firms. If firms become

more willing to share information with other companies such as that in Case 1 then impacts will certainly be seen in the *industry* level.

5.2.3.3 Knowledge Management

There are very limited impacts in the area of knowledge management. In the *task* level the Internet has helped company staff develop new skills in the area of Website maintenance. A major opportunity exists in the *business contacts* category for the company to use persistent cookies to track visitors around the Website, and there are tentative plans to implement such a system. The potential advantages would include being able to determine the most popular pages on their site, common paths people follow, where most people decide to leave the site from. With such a large site to maintain it would help the company to focus on the areas that most people look at. In the future cookies could also be used for customising each client's experience with the Website.

5.2.3.4 Productivity

The *productivity* category is where most of the impacts have been focused. Internally the Internet has lead to a substantial reduction in printing and mailing costs at the *organisation* level, and the addition of time consuming duties at the *task* level. The company has recognised this last impact as being counter productive and has initiated steps to implement a database solution that will make updates to the Website less cumbersome.

The major impact of the Internet for the company is the increased visibility the Internet has provided to the firm. This has lead to a massive increase in customers, and to significant increases in revenue.

5.2.3.5 Environment

There have been no discernible impacts in the *environment* category for the company.

5.2.4 Lederer et al.'s (1997) Questionnaire[12]

Lederer et al.'s (1997) questionnaire results were analysed by grouping the responses into the six categories and calculating the mean score for each category. The results for each firm are presented in Appendix J.

Table 5-1 Impact Category Rankings for Case 1

Category	Position	Score
Productivity	1	6.4
Competitiveness	2	6.2
Information	3	6.125
New Applications	4	5.5
Cost Savings	5	5.2
Planning and Control	6	4.3

Table 5-2 Highest Rated Impacts for Case 1[13]

Category	Impact	Score
C	enhance competitiveness or create strategic advantage	7
C	provide new products or services to customers	7
I	improve customer relations	7
I	enable the organisation to respond more quickly to change	7
S	save money by reducing communications costs	7
P	enhance employee productivity or business efficiency	7
P	speed up transactions or shorten business cycles	7

Productivity was the highest rated category, with no scores lower than six. Competitiveness and Information also scored highly. Generally cost savings, new applications, and planning and control impacts didn't score so highly although "saving money by reducing communications costs" was one of the highest ranking impacts.

5.2.5 Discussion

Both models show productivity as having the most impact. It is evident however that while Lederer et al.'s (1997) productivity category is mainly concerned with efficiency impacts,

---

[12] See Appendix J for the results of Lederer et al.'s (1997) questionnaire.

[13] Key: C - competitiveness, I - information, S - cost savings, P - productivity.

Lymer et al.'s (1997b) category extends broadly beyond that to cover cost, time savings and reach impacts (as discussed in Chapter Four). This may be an indication that Lymer et al.'s category needs to be broken down further.

Competitiveness, the second most impacted category in Lederer et al.'s (1997) questionnaire, which is subsumed by Lymer et al.'s (1997b) *knowledge management* and *environment* categories, was not identified in the interview. The highest ranked competitiveness impacts are obviously significant for the firm,[14] although no direct evidence in the form of quotes for these impacts was picked up in the interview. This can possibly be attributed to a flaw in the interview instrument, or to interviewer impact, and helps reiterate the highly subjective nature of qualitative research of this kind.

Savings in communication costs scored highly in both models, however this impact was diluted in Lederer et al.'s (1997) model by the other cost savings impacts included in the instrument that were not evident in the company in Case 1, and in Lymer et al.'s (1997b) model cost savings impacts have been subsumed into productivity.

Information scored highly with Lederer et al.'s (1997) model, as did *communication* and *information retrieval* in Lymer et al.'s (1997b) model.

An additional point is that during the analysis several opportunities for using the Internet were uncovered. Lymer et al.'s (1997b) model is not designed to deal with opportunities such as these, which is something that could be addressed in any revised model.

In summary, levels of impacts are generally consistent between the two models, however there are several types of impacts that need to be more clearly defined in the Lymer et al. (1997a,b) model. These problems are discussed further in Chapter Six.

---

[14] The firm certainly uses the Internet to provide new products and services. This may be a case of disregarding something because it seems so obvious.

5.3 CASE 2: FINANCE

5.3.1 Overview

The company in Case 2 is Christchurch based and specialises in providing foreign exchange, currency management, and market information services to clients both in New Zealand and overseas. The company was founded in 1986 and currently employs eight permanent staff members.

E-mail and Web browsing do not play a large part in the Internal operations of the company. The impacts mainly come from the company's Internet based direct dealing system, which was developed in 1997. The major impacts have been to the company's foreign client base; the Internet helping by allowing the firm to transcend the language barrier.

Future plans for the Internet include offering clients a detailed transaction analysis through a virtual private network, and the inclusion of real time financial rates on the Website.

5.3.2 Impacts Derived From the Interview

5.3.2.1 Expansion of International Client Base

The company uses the Internet primarily as a way of attracting orders from overseas. They prefer their New Zealand customers to phone them so personal contact can be maintained.

> *[Overseas clients] are the primary target of the Internet for us. Locally there is very little penetration, but internationally it is a great way in for us.*
>
> *There has been an increase in international clients definitely.*

5.3.2.2 Reach into Previously Unattainable Markets, Especially Through the Language Barrier

As well as attracting new clients internationally, the Website has helped the company transcend the language barrier to a large degree. This has opened up a large new market, and there is the potential for other languages to be accommodated for if interest is shown.

We have a Japanese version of our site which is doing well. There are no current plans for other languages but if we had clients coming in from Germany or France we would look at catering to them.

5.3.2.3 Not Adding Value to Existing Customers

The company's Website is not designed with national clients in mind, although it is an easy way for clients to check current rates without having to phone for them. The company hopes to change this soon by offering confidential transaction analysis reports to all its customers online.

The New Zealand stuff we don't try to put through the Web because we can give clients a better service if we are actually talking to them.

5.3.2.4 Reduction in Travel Costs

Reduction in travel costs is a major impact for the company.

It is very expensive to go to L.A. or Tokyo and talk to clients, but we can do that very cheaply through the Internet.

5.3.2.5 Faster Delivery of Information to Customers

The inclusion of currency rates on the Internet means that customers can access almost real time data without having to make phone calls to the company. This saves time internally, as well as being beneficial to the customers.

At the moment the financial rates on the Web are close to real time. They are updated every 10 - 12 minutes. This negates customers having to ring us up for the current rates.

5.3.2.6 Website Promotion is Low Key due to Possible Threats from Suppliers

If banks were to put their own direct dealing systems in place or cut the company out of the loop then they would consider that a threat.

Our strategy at the moment is to keep it low profile, not go out there and look like a tall poppy. The reasoning behind it was maintaining favourability with banks. If banks say 'we're not dealing with you any more, we're kind of...you know, in a very difficult position.

5.3.2.7 Negotiations Through E-mail Reduce Phone Costs

All contracts are faxed out at the company, whether the order comes in by phone, fax, or Internet. This is because the company feels that they would be on shaky legal ground if they had to try to enforce an e-mail contract in court. However most of the negotiation phase can be done online which contributes to keeping the phone bills down.

Everything still goes through fax. There are no precedents for recourse on e-mail, whereas there are on fax.

I am not aware of the validity of e-mail as a media for contract, but the use of e-mail obviously negates many phone calls that would otherwise be required. If we were marketing by telephone, rather than a web presence, our phone bills would be rather high.

5.3.3 Application of Lymer et al.'s (1997b) Model

Most impacts may be categorised in the *productivity* category, with limited, but significant impacts in *communications*, and *knowledge management*.

Figure 5-2 Mapping Case 2 to Lymer et al.'s (1997b) Model

Matrix Model of Internet Impacts Lymer (1997)			Levels of Impacts			
			External		Internal	
			Business Contacts	Industry	Organisation	Task
Categories of Impact	Input	Communication (2 way)	E-mail negotiations save time and money All contracts must be faxed. Costs time and money			
		Information Retrieval (1 way)	Faster delivery of rates to customers			
	Output	Knowledge Management	Website enables ELA to reach through language barrier Not adding value to existing customers			
		Productivity (Use of Knowledge)	Expansion of international client base Faster delivery of rates to customers		Reduction in travel costs	
		Environment (Context of Impact)		Low key promotion of site due to threat from banks		

5.3.3.1 Communication

The impacts in the *communication* category are all external as the company feels that their office is too small to warrant internal e-mail communication between staff. Externally the major impacts are the reduction of phone costs, and the time savings that are gained through negotiating with their clients via e-mail. Once the company is aware of any precedents enforcing the legality of business contracts through e-mail there is the potential for more cost savings as many contracts will not have to be faxed.

5.3.3.2 Information Retrieval

There have been limited impacts in the *information retrieval* category. Externally, the Reuters frame relay network allows the company to always have the latest financial rates to pass on to the customer. Internally there are very limited impacts (not significant enough to list in the table) felt in the *organisation* and *task* level through the managing director and the systems supervisor browsing the Web for knowledge, and information about competitors' sites.

5.3.3.3 Knowledge Management

There have been significant impacts in external level of the *knowledge management* category. The company has used the Internet to target Japanese customers that it otherwise would have had no way to reach. Further plans are underway to make the Website more useful to its national clients by offering detailed transaction reports and analyses, perhaps through a virtual private network.

No significant impacts have been felt at the internal level.

5.3.3.4 Productivity

Most impacts have been felt in the *productivity* category, internally with the reduction of travel costs, and externally, with faster delivery of information to customers and the expansion of the company's international client base. Productivity impacts have not been felt at the *task* or *industry* levels however, so opportunities may exist for the company here.

5.3.3.5 Environment

The Internet has not had significant impacts for the *environment* except in the *industry* level where the firm feels it is under pressure not to promote its new online service too vigorously.

5.3.4 Lederer et al.'s (1997) Questionnaire

Table 5-3 Impact Category Ratings for Case 2

Category	Position	Score
Competitiveness	1	5.2
Cost Savings	2	4.6
Information	3	4.375
New Applications	4	4
Productivity	4	4
Planning and Control	4	4

Table 5-4 Highest Rated Impacts for Case 2[15]

Category	Impact	Score
C	change the way the organisation conducts business	7
S	save money by reducing travel costs	7
C	provide better products or services to customers	6
I	enable faster retrieval or delivery of information or reports	6
PC	help establish useful linkages with other organisations	6

Competitiveness is the highest ranked category. Cost savings and Information both scored well. New applications and productivity did not score highly, due mainly to one or two low scored impacts in each category. Planning and control had one high score.

5.3.5 Discussion

Again Lymer et al.'s (1997b) model does not sufficiently address Lederer et al.'s (1997) competitiveness impacts, although it may not be worth adding such a category to the Lymer et al. model as Lederer et al.'s category does not seem to be very well named (see Chapter Six for further discussion on this issue). Cost savings impacts are high on both models, again with cost savings being included under Lymer et al.'s *productivity* heading. Productivity has the greatest impacts in the Lymer et al. model; in the Lederer et al. model it is last equal. This discrepancy is almost certainly due to the fact that Lymeret al.'s *productivity* category has a very large scope, including reach, effectiveness, and cost savings impacts.

---

[15] Key: C - competitiveness, I - information, S - cost savings, PC - planning and control.

Information ranks highly in Lederer et al.'s (1997) model, as does *communication* in Lymer et al.'s (1997b) model, with *information retrieval* playing a less integral but still significant role.

Knowledge management and New Applications are ranked about evenly in both models. There is little impact in the planning and control, and environment sections of both models.

In summary there are some disparities between the models in this case. Generally the differences are not a result of different impacts being identified, but are due to categorisation differences between the models. As such the differences are not irreconcilable.

5.4 CASE 3: COMPUTER RETAIL

5.4.1 Overview

The company in Case 3 is New Zealand's largest Apple Macintosh Dealer, with 31 employees in its main Christchurch office, and seven employees in each of the three other major centres. It operates as a retailer, mail order service, and a sub-distributor of Apple Products.

The company's Website currently has little impact on the firm, however plans are underway to make more effective use of the tool. Many of the major impacts come from the firm's use of their Intranet between offices. Sending catalogues and other information online rather than through a courier service has greatly reduced costs for the company, but time wasting through their internal chat system has been a problem.

Future plans for the Internet include an EDI type interface with their supplier's online transaction system, and putting updates to their catalogue online.

5.4.2 Impacts Derived From the Interview

5.4.2.1 Lower Phone Costs due to Intranet

Since installing their own Intranet between offices, the company has found that their phone costs have reduced dramatically.

> *It's certainly saving us in phone bills - a lot!*
>
> *Before if we wanted to talk to Wellington it was fax or phone. So it saves us. We are just looking at the savings now, it is early days, but just in the number of calls and the way we handle these things.*

5.4.2.2 Time Wasting on Intranet

The Intranet also gives staff a new opportunity to spend time gossiping. The company has a chat function to communicate between centres, and employees have been abusing it.

> *We are about to issue an edict that says 'look we've had enough of the private e-mails and the jokes going around. It's all very funny and well and good, but it's not to be done during work hours. It's like extending your lunch break or taking two or three morning tea breaks'.*

5.4.2.3 Extra Revenue Through Site Hosting

The company maintains its own Webserver internally, which gives it the opportunity to host Websites for other companies. This is generating considerable income for them.

> *We're hosting high end sites so it is generating revenue. We're hosting sites where they are doing online commerce, where it requires some degree of expertise to keep it up and running. We're not just hosting Mum and Dad's Webpage.*

5.4.2.4 Better Relationship with Suppliers due to Faster Retrieval of Information

Before their suppliers were online, and before the major hardware businesses had Websites, relations with the company's suppliers were often strained because information was slow to arrive. Those problems have been alleviated now due to the Web.

> *When we used to have to rely on the New Zealand distributor for information, we could never find out. For updates and things now, we just go to their homepage. The latest things are up there, and we can download them in the same time as anyone else in the world.*

5.4.2.5 Faster Delivery of Information to Customers

The company have the latest virus and product information on their page, and they aim to update their site at least weekly, and as important information comes to hand. This way their customers will keep coming back to their site.

Because it's such a changing market, everyone wants the latest and greatest the minute it comes out. Of course because our customers are on the Internet, they find out half the time before we've had a chance, and the New Zealand distributor won't necessarily know about what's going on.

You can send out catalogue after catalogue and they go out of date, but the Webpage always has the latest thing.

5.4.2.6 Threats from Companies Moving to Virtual Warehousing

Since adopting the Internet the company has opened three additional branches around the country. They feel that the customer still needs to be able to touch the product and not just order it online. But there are risks with this approach.

We could be the place that everyone comes to look at it. But if our pricing is out, they will just go and buy it from some virtual warehouse.

5.4.2.7 Culture - Remote Offices Feeling Closer

The Intranet has helped to narrow the distance between the offices. Now that communication and file transfer is virtually instantaneous, the remote branches don't feel left out in the cold.

Helps eliminate the head office - branch office mentality, because they can get the information from us as quickly as we can get it to our own people. In any industry when you are behind, and someone else rubs it in that they know something before you, you feel bad. So it pulls the staff closer together.

5.4.3 Application of Lymer et al.'s (1997b) Model

The major impacts for the company have been at the *communication* level. Future impacts may soon be felt in the category of *information retrieval*. There are also important impacts in the *environment* category.

Figure 5-3 Mapping Case 3 to Lymer et al.'s (1997b) Model

Matrix Model of Internet Impacts Lymer (1997)			Levels of Impacts			
			External		Internal	
			Business Contacts	Industry	Organisation	Task
Categories of Impact	Input	Communication (2 way)			Intranet -> decreased phone costs	Intranet -> time wasting
		Information Retrieval (1 way)		Better relationship with suppliers due to faster information retrieval		
	Output	Knowledge Management	Site hosting generates revenue			
		Productivity (Use of Knowledge)	Faster delivery of information to customers			
		Environment (Context of Impact)		Threats?	Remote offices feel closer	

5.4.3.1 Communication

Most of the impacts have been felt in the *communication* category. Externally the impacts have not been great, however due to the installation of the company's Intranet, the internal *communications* impacts have been widespread. Opportunities exist for the company to capitalise on their Intranet for more internal impacts, things such as video conferencing are possibilities for the future. External *communications* could also be improved with e-mail between suppliers and business contacts possibly negating "phone tag" problems.[16]

5.4.3.2 Information Retrieval

The major impact of *information retrieval* has occurred in the *industry* level where relationships with suppliers have improved. The Internet also gives the company the ability to source information and deliver it to their customers faster and more easily than ever before. There are many opportunities in this area, and the firm currently have major plans for the Internet in this respect. Among the major changes planned are making the site less static, putting updates to their catalogue online, and giving their customers "*somewhere to go with their Imac*".

---

[16] Such as those experienced by the researcher when attempting to arrange an interview with the company.

5.4.3.3 Knowledge Management

There are limited impacts in the *knowledge management* category, but there are several opportunities that the company is looking into. Currently the only major impact is at the *business contact* level where the firm is hosting sites for other companies. The company has plans to move to online ordering, and also to implement an interface to their major supplier's online ordering system. These changes would have the effect of increasing sales for the company, and decrease the time spent re-keying orders.

5.4.3.4 Productivity

Productivity impacts have been very limited. Apart from faster delivery of information at the *business contact* level and possibly time wasting with chat[17] at the *task* level, there are no significant impacts.

5.4.3.5 Environment

The only significant impact for the *environment* is that the remote offices feel closer. There are however potential threats if other companies move to virtual warehousing.

5.4.4 Lederer et al.'s (1997) Questionnaire

For consistency[18] and ease of analysis, only the Managing Director's questionnaire is included in this section.[19] This does not affect the analysis greatly as each category had the same ranking from each respondent except for the highest and lowest categories, which were transposed.[20]

---

17 Classified under *communication.*

18 Analysing both questionnaires would provide a check on the validity of the findings, however as the Systems Consultant was not interviewed, it cannot provide a check on the utility of Lymer et al.'s (1997b) model as one set of answers cannot be compared with another.

19 See Appendix J for the full set of data.

20 i.e. the MD's highest category was last on the Systems Consultant's list, and vice versa.

Table 5-5 Impact Category Ratings for Case 3

Category	Position	Score
Cost Savings	1	5
Competitiveness	2	4.8
Information	3	4.75
New Applications	4	4.5
Planning and Control	5	4.2
Productivity	6	3.6

Table 5-6 Highest Rated Impacts for Case 3[21]

Category	Impact	Score
C	provide better products or services to customers	6
I	enable easier access to information	6
I	improve accuracy or reliability of information	6
I	increase volume of information output	6
P	provide the ability to perform maintenance faster	6
PC	help establish useful linkages with other organisations	6
PC	improve management information for strategic planning	6
S	save money by reducing communications costs	6
S	save money by reducing travel costs	6

Cost savings was the highest ranked category, followed by competitiveness and information. Information had the highest number of top ranked impacts but was pulled down significantly by a "two score" for "improve customer relations". This impact is something the company soon plans to address with its revamp of the Website. Competitiveness had only one top scored impact, although most other impacts were "fives", showing that this category was consistently important.

5.4.5 Discussion

Communication and *information retrieval* impacts were most evident in Lymer et al.'s (1997b) model, but were only third in Lederer et al.'s (1997) model. As mentioned in Section 5.4.4 however, information was pulled down in Ledereret al.'s model by one low scoring impact.

21 Key: C - competitiveness, I - information, S - cost savings, PC - planning and control, P - productivity.

Cost savings were the most evident impacts in Lederer et al.'s (1997) model. In Lymer et al.'s (1997b) model most cost savings are subsumed under the *productivity* category which had limited impacts. However the *communication* category in Lymer et al.'s model also includes cost savings impacts for the company in Case 3. This may explain the disparity, and also indicates the ambiguity of Lymer et al.'s impacts categories (discussed further in Chapter Six).

Competitiveness was again rated highly in Lederer et al.'s (1997) model, and missed by the analysis with Lymer et al.'s (1997b) model. The highest rated competitiveness impact was "provide new products or services to customers", this impact ranked highly in all of the firms, and is the same impact that was missed by the interview in Case 1, indicating again a deficiency in the interview instrument, and perhaps a need for a separate category in Lymer et al.'s model to deal with such impacts. Several researchers have included it as part of their Internet frameworks (Rackoff et al., 1985; Chan and Huff, 1993; Grover et al., 1994; Rao et al., 1995; Bloch et al., 1996; Cronin, 1995; Abell and Black, 1997; Ghorab, 1997; Tallon et al., 1997).

Productivity was rated lowly in both models. The *environment* in Lymer et al.'s (1997b) model had significant impact, this category has no equivalent in Lederer et al.'s (1997) instrument.

In summary, both models gave similar results (after accounting for discrepancies) except for the competitiveness category in Lederer et al.'s (1997) instrument, and the *environment* category in Lymer et al.'s (1997b) model.

5.5 CASE 4: IS CONSULTING

5.5.1 Overview

The company in Case 4 provides Information Technology services to its clients, specifically in the area of network integration. The company prides itself on being able to provide a "*total solution*" for the customer, from the initial audit and recommendations, through to the installation, and ongoing maintenance and support of the system. Branches

of the company operate in Auckland and Christchurch, with a total of 18 permanent staff members, and on-call additional sub-contractors for specific projects.

The company has had a Web presence for three years, mainly as an introduction to the firm rather than for any revenue generating purpose. Most of the impacts of the Internet come from internal and external e-mail communications, information gathering and online ordering from their suppliers.

Future plans for the Internet include adding an online ordering system, and further developing information sharing with their clients, suppliers, and competitors.

5.5.2 Impacts Derived From the Interview

5.5.2.1 Web Browsing and Internal E-mail Used for Time Wasting

Time wasting has been a major impact for the company. Every PC is equipped with e-mail and browsing capabilities, and there have been problems with people using the Internet for non-work related purposes.

> *We get accurate stats about what sites people are hitting and it is just a matter of sending around a group e-mail at times to control it. We don't have an official policy, just use it responsibly, it is not too hard to find out if someone is abusing the system.*

> *We have e-mails going all over the place, in fact it gets so silly sometimes that we have to clamp down. For example we have a shared laser printer and our receptionist got a bit carried away at one stage and said that 'if you notice the toner is low please e-mail me.' That is just ridiculous when you can walk 20 feet and yell at her. It's just a matter of knowing when to e-mail and when not to. You know what's going to be productive out of an e-mail and what's just wasting time.*

5.5.2.2 E-mail with Suppliers - Time Savings and Gives Written Record of Negotiations

Using e-mail with their suppliers saves time playing phone tag, and also gives the company written proof of any negotiations.

> *We find they are pretty hard to get hold of by phone and it is a lot easier just to e-mail them. Also if we're negotiating price by e-mail, we have it there in writing, it's not just verbal.*

5.5.2.3 Faster Decision Cycles using Suppliers Online Ordering Systems

As both of their major suppliers are online, the company can check to see if either has an item in stock, and which is cheaper, before deciding where to buy. This saves both time and money.

> *It's very convenient - we can order products over the net from x, they have an online ordering system. Plus we can go straight to the y site and have a look at exactly what stock they've got. So if x haven't got it, we can order from y.*

5.5.2.4 Gives Hi-tech Image to Hi-tech Firm

The Internet is very useful in giving the company a hi-tech image, something which consumers of their services expect.

> *You have to have it these days. We're talking to clients that aren't from Canterbury and they judge you from the Webpage you have. It is an image thing as well. We are a high tech company, we should have a Webpage they can refer to. In a lot of cases customers will hit the Webpage to have a look at your profile rather than you having sent them anything.*

5.5.2.5 Increased Paper Costs

One of the significant impacts of the Internet of the company is the increase in paper usage. Because the Internet is such a volatile medium, any pricing information that is sourced from it is printed out. E-mail negotiations with suppliers are also printed out.

> *More paper comes out of that laser these days than it ever did.*

> *If our suppliers change the pricing on their Website then the evidence is gone. This way we've actually got a confirmed price printed off.*

5.5.3 Application of Lymer et al.'s (1997b) Model

The major impacts for the company are in the *communications* and *productivity* areas. Impacts have also been felt in the *environment*. *Information retrieval* and *knowledge management* have felt no significant impacts to date.

Figure 5-4 Mapping Case 4 to Lymer et al.'s (1997b) Model

Matrix Model of Internet Impacts Lymer (1997)			Levels of Impacts			
			External		Internal	
			Business Contacts	Industry	Organisation	Task
Categories of Impact	Input	Communication (2 way)	E-mail -> time savings	E-mail -> written record of negotiation		Web browsing and Internal e-mail -> time wasting
		Information Retrieval (1 way)				
	Output	Knowledge Management				
		Productivity (Use of Knowledge)		Suppliers online -> faster decision cycles	Increased paper costs	
		Environment (Context of Impact)	Gives hi-tech image to firm			

5.5.3.1 Communication

Communications is the biggest area of impact for the company, with major impacts at both the external and internal levels. From the firm's point of view not all of the internal impacts are positive, there have been many problems with time wasting.

5.5.3.2 Information Retrieval

The Internet is not used by the company for any significant *information retrieval.* Considering the industry that the company is part of, this is certainly a weakness that could be addressed.

5.5.3.3 Knowledge Management

The company does not use the Internet for *knowledge management* activities. The Internet is not seen as something that could currently help the firm with their core business, and this could be part of the reason that the Internet has had such little impact. The company does have plans to start imaging many of their documents and make them available online over their Intranet, so impacts may be felt in this category in the future.

5.5.3.4 Productivity

There have been several *productivity* impacts for the company. In the *industry* level, faster decision cycles, and in the *organisation* level, increased paper costs. A change of culture may be advisable to cut down on paper and printing costs, with employees only printing what they need, and saving other data to a hard drive or some other form of electronic storage medium.

Impacts at the *task* and *business contact* level have not been significant. The facility is in place for clients to e-mail the company's help desk, but this option is rarely used.

5.5.3.5 Environment

The only significant impact for the *environment* is that having a Web presence gives the company a hi-tech image to its potential clients.

5.5.4 Lederer et al.'s (1997) Questionnaire

Table 5-7 Impact Category Ratings for Case 4

Category	Position	Score
Productivity	1	5.6
Information	2	5.125
Planning and Control	3	5
Competitiveness	4	4.8
Cost Savings	5	3
New Applications	6	3

Table 5-8 Highest Rated Impacts for Case 4[22]

Category	Impact	Score
I	enable the organisation to respond more quickly to change	7
PC	help establish useful linkages with other organisations	7
C	provide better products or services to customers	6
I	enable easier access to information	6
I	increase the flexibility of information requests	6
I	improve accuracy or reliability of information	6
P	align well with stated organisational goals	6
P	enhance employee productivity or business efficiency	6
P	speed up transactions or shorten business cycles	6
P	provide the ability to perform maintenance faster	6
S	save money by reducing communications costs	6

Productivity was the highest ranked category, with scores of six for three out of the four impacts in the group. Information, planning and control, and competitiveness also scored well, and consistently. Cost savings and new applications both scored poorly, although the cost savings category had one very high scoring impact (save money by reducing communications costs).

5.5.5 Discussion

Productivity and information / communication impacts were the most significant categories for both models. *Communication* had the most significant impacts in Lymer et al.'s (1997b) model, but was ranked second in Lederer et al.'s (1997) instrument. This is most likely due to the fact that Lymer et al.'s questionnaire only contains positive impacts, while several of the impacts in Lymer et al.'s communications category were detrimental for the firm.

Cost savings ranked lowly in Lederer et al.'s (1997) instrument with the exception of "save money by reducing communications costs". This impact was also picked up in Lymer et al.'s (1997b) model.

---

22 Key: C - competitiveness, I - information, S - cost savings, PC - planning and control, P - productivity.

Planning and control in Lederer et al.'s (1997) questionnaire had one major impact, "help establish useful linkages with other organisations". This impact maps to Lymer et al.'s (1997b) *environment* category (see Figure 4-1), and was not picked up in that model.

New applications, which maps to Lymer et al.'s (1997b) *knowledge management*, was not considered significant in either model.

In summary, generally the two models give consistent results excepting Lederer et al.'s (1997) high ranking planning and control impact, which was not picked up in Lymer et al.'s (1997b) model.

5.6 CROSS-CASE ANALYSIS

Each major impact derived from the interviews (Table 5-9) has been mapped to Lymer et al.'s (1997b) model (Figure 5-5) and the impacts are discussed as a group. Rankings from Lederer et al.'s (1997) instrument are also consolidated (Table 5-10, Table 5-11) and the results from the two models are compared.

Table 5-9 List of Impacts for Each Firm

Case 1
A1 increased visibility - massive increase in customer base A2 reduction in paper costs A3 collaboration with competitors for customers' benefit A4 short-sightedness of suppliers limiting further expansion A5 new skills - Website maintenance A6 faster and more effective communication with customers
Case 2
B1 expansion of international client base. B2 reach into previously unattainable markets - especially through language barriers B3 not adding value to existing customers B4 reduction in travel costs B5 faster delivery of information to customers B6 website promotion low key due to possible threat from banks B7 negotiations through e-mail reduce phone costs

Table 5-9 (continued) List of Impacts for Each Firm

Case 3
C1 reduced communications costs C2 internal communications - time wasting C3 revenue through site hosting C4 faster retrieval of information from suppliers => better relationship C5 faster delivery of information to customers C6 increasing physical presence - threats from companies using virtual warehousing C7 culture - remote offices feel closer
Case 4
D1 internal e-mail and Web browsing - time wasting D2 e-mail with suppliers - time savings, and written record of negotiation D3 supplier online ordering system - the company can instantly determine where to buy D4 hi-tech firm needs hi-tech image D5 increased paper costs

Figure 5-5 Mapping All Firms to Lymer et al.'s (1997b) Model

Matrix Model of Internet Impacts Lymer (1997)			Levels of Impacts				
			External		Internal		
			Business Contacts	Industry	Organisation	Task	
Categories of Impact	Input	Communication (2 way)	4	1	1	2	8
		Information Retrieval (1 way)	1	1	0	1	3
	Output	Knowledge Management	4	2	1	1	8
		Productivity (Use of Knowledge)	3	1	2	0	6
		Environment (Context of Impact)	1	2	1	0	4
			13	7	5	4	29

5.6.1 Lymer et al.'s (1997b) Categories of Impact

All of the impacts discovered were able to be mapped to Lymer et al.'s (1997b) model, however some of the impacts were caused by threats to the company from external sources,

and Lymer et al.'s model does not clearly differentiate these types of impacts. Also there were several potential opportunities discovered for each firm that could not be classified in terms of Lymer et al.'s model.

Communications impacts numbered highly for all firms. All of the firms except that in Case 3 had impacts focused at the external level, especially for business contacts. The company in Case 3 had no external communications impacts, but strong internal impacts.

Information retrieval did not number very highly except with the company in Case 1. The companies in the other three cases tended to use the Internet more for strategic purposes or internal communication. This may change for the company in Case 3 in the near future, and the company in Case 2 is also implementing systems to take advantage of impacts in this area. There is a definite opportunity in this category for the company in Case 4 to update its Website image.

Knowledge Management rated highly in Case 1 over all levels, and for Cases 2 and 3 at the business contacts level. This category had the highest equal number of impacts, which may be due to its very broad, and quite ambiguous scope. Most of the impacts were felt at the external levels.

Productivity had the second highest number of impacts, which were especially evident in Cases 2 and 4. The company in Case 1 also has opportunities to create impacts in this category with its new database system. Again the high number of impacts in this category may be due to the broad and ambiguous scope of the category. Many productivity impacts would perhaps be better classified as cost savings, or reach impacts (this is further discussed in Chapter Six).

There were several impacts in the environment category. The company in Case 3 felt them quite heavily, and the companies in Cases 2 and 4 both had external level environment impacts.

5.6.2 Lymer et al.'s (1997b) Levels of Impact

Business contacts impacts were the most numerous for the four firms. Thirteen of the twenty nine total impacts were at this level. This is not consistent with Lymer et al.'s (1997a) expectation that the organisation level would be most susceptible to Internet induced change. This may reflect the fact that in the eighteen months since Lymer et al.'s original study was published, many more firms have come online, and doing business via the Web may be gaining more impetus.

The industry level had the second highest number of impacts across all of the firms. Together with business contacts, the two external levels made up twenty of the twenty nine impacts. This is consistent with Lymer et al.'s (1997a) presumption that the industry level will become more important as time goes on.

The internal categories of impact were not significantly felt by most of the companies. The company in Case 1 was affected the most, claiming five out of the nine total impacts in the two categories. This may be because it is such a small company and its whole way of doing business has been altered by the Web. For the other companies the Internet does not really generate or eliminate new activities, it just acts as an alternative tool to accomplish those tasks (Lymer et al., 1997a).

5.6.3 Discussion

Table 5-10 Rankings for Lederer et al.'s (1997) Impacts Categories

Category	Case 1	Case 2	Case 3	Case 4	Mean
Productivity	1	4	6	1	**4.90**
Competitiveness	2	1	2	4	**5.25**
Information	3	3	3	2	**5.09**
New Applications	4	4	4	6	**4.25**
Cost Savings	5	2	1	5	**4.80**
Planning and Control	6	4	5	3	**4.38**

Table 5-10 shows the rankings for each category of Lederer et al.'s (1997) questionnaire over the four firms, and the mean score for each category (see Appendix J for the table of calculations). The categories are ranked in order of importance in Table 5-11.

Table 5-11 Rankings for Each of Lederer et al.'s (1997) Categories

Category	Rank
Competitiveness	1
Information	2
Productivity	3
Cost Savings	4
Planning and Control	5
New Applications	6

Competitiveness rated highly for all firms, ranking first or second for three of the four firms. This is due in a large part to the impact "provide new products or services to customers" which consistently ranked highly. The high ranking of this category is consistent with Lymer et al.'s (1997b) model; twelve of the twenty nine impacts fell in the *knowledge management* or *environment* categories, where competitiveness maps to, although it is difficult to draw firm conclusions given the breadth of scope of Lymer et al.'s categories. Also relevant is the fact that the main impact in the competitiveness category was not picked up in Lymer et al.'s model.

Information ranked in the top three for all firms, but was never rated as the top category of impact. It's consistent importance is evident however, and this is shown in Lymer et al.'s (1997b) model also; *communication* and *information retrieval* contained eleven of the twenty nine impacts.

Productivity impacts were mixed for the firms, two of the four firms ranked the category most highly, but the other two ranked it in the lower half of the categories. Productivity had the second highest number of impacts in Lymer et al.'s (1997b) model but as previously discussed this category includes impacts that are not covered in Lederer et al.'s (1997) productivity category, so it is difficult to draw accurate comparisons.

Cost savings also had mixed impacts on the firms. Two companies ranked it either first or second, however the other two ranked it fourth and fifth. Cost savings impacts map onto Lymer et al.'s (1997b) *productivity* and *communication* categories, which both had high levels of impact.

Planning and control impacts were not particularly obvious for any of the firms; the most evident impact was "help establish useful linkages with other organisations", this was picked up in Lymer et al.'s (1997b) *environment* category for many of the firms.

New applications was ranked last over all the firms in Lederer et al.'s (1997) model. This result can be somewhat mitigated as the category was ranked fourth in three of the four firms. New applications maps to Lymer et al.'s (1997b) *knowledge management* category, the scope of which makes it difficult to draw useful comparisons. None of the new applications impacts were rated as top impacts by any of the firms.

In summary, at the cross-case level, given the differences between the two models it is difficult to make accurate comparisons between them. Useful comparisons can be drawn however at the firm level, where the individual impacts can be studied. Comparing and contrasting Lederer et al.'s (1997) model with Lymer et al.'s (1997b) has given insights into the construction of Lymer et al.'s (1997b) model, and into the difficulties of effectively applying it. These issues, along with those raised in Chapter Four will be discussed in Chapter Six.

5.7 CONCLUSION

This chapter has discussed the various impacts that the Internet has had on the selected firms and highlighted problems with Lymer et al.'s (1997b) model that will be investigated further in Chapter Six. The major issues were 1) cost savings impacts were very evident yet are subsumed under Lymer et al's *communication,* and *productivity categories*; 2) Lymer et al.'s *productivity* and *knowledge management* categories are very broad and ambiguously defined; 3) Lymer et al.'s model makes little provision for threats, and no provision for opportunities that firms may encounter.

The problems specifically relate to the scope of Lymer et al.'s (1997b) impact categories, and the difficulties of classifying some of the impacts in terms of the model. Lederer et al.'s (1997) instrument has helped to point out possible areas for improvement, but there are difficulties with this model also. Chapter Six picks up these points, and issues raised in Chapter Four, and suggests a revised framework for analysing the impacts of the Internet.

6. A REVISED MODEL OF INTERNET IMPACTS

6.1 INTRODUCTION

This chapter forms phase four of the research. The issues raised about Lymer et al.'s (1997b) model from discussing other frameworks, mapping impacts from the literature, and applying the model to four small firms are consolidated and discussed.

A revised model of Internet impacts is suggested. As a form of validation for this revised model, the 120 Impacts from the literature, as well as the impacts derived from the case studies are mapped to the new model

6.2 DISCUSSION OF LYMER ET AL.'S (1997B) LEVELS OF IMPACT

Figure 6-1 Impacts from the Literature

Matrix Model of Internet Impacts (Lymer et al. (1997b))			Levels of Impacts				
			External		Internal		
			Business Contacts	Industry	Organisation	Task	
Categories of Impact	Input	Communication (2 way)	10%	5%	2%	2%	18%
		Information Retrieval (1 way)	3%	5%	1%	0%	9%
	Output	Knowledge Management	3%	3%	5%	3%	13%
		Productivity (Use of Knowledge)	13%	3%	10%	12%	37%
		Environment (Context of Impact)	3%	11%	10%	0%	23%
			31%	26%	27%	16%	
			57%		43%		100%

Figure 6-2 Impacts from the cases[23]

Matrix Model of Internet Impacts (Lymer et al. (1997b))			Levels of Impacts				
			External		Internal		
Categories of Impact			Business Contacts	Industry	Organisation	Task	
	Input	Communication (2 way)	14%	3%	3%	7%	28%
		Information Retrieval (1 way)	3%	3%	0%	3%	10%
	Output	Knowledge Management	14%	7%	3%	3%	28%
		Productivity (Use of Knowledge)	10%	3%	7%	0%	21%
		Environment (Context of Impact)	3%	7%	3%	0%	14%
			45%	**24%**	**17%**	**14%**	**100%**

6.2.1 External Levels of Impact

The comparison of Lymer et al.'s (1997b) framework with other frameworks of IS impact and effectiveness in Section 4.3, revealed that there was little support for Lymer et al.'s external levels of *business contacts* and *industry*. Most models classify these external or market impacts in terms of competitors, suppliers, and customers (Porter, 1980; Gable, 1994; Cronin, 1995; Rao et al., 1995; Sterne, 1995; Abell and Black, 1997; Tallon et al., 1997). It was suggested in Section 4.3 that it may be clearer to replace Lymer et al.'s external levels of impact with competitors, suppliers, and customers.

Further support for this proposal was discovered when mapping the individual impacts from the literature and cases to Lymer et al.'s (1997b) model. It was often difficult to determine whether an impact fell under the scope of business contacts, or industry. For example in one firm a supplier may be part of the industry, but not so in another firm. This leads to inconsistencies with classifying impacts and reduces the usefulness of the model for cross-business analysis.

57% of all impacts picked up by the literature were external (Figure 6-1). However the literature only covered the period up to 1997, with many impacts coming from much older studies. In the more recent case studies this figure increased to 69% which may signify the progression of the use of the Internet from a productivity tool to having a significant

---

23 It must be stressed that these percentages should only be used as approximates as the sample size is small for the cases, and the addition of one more case could potentially make a large difference to the results. Notwithstanding this, the decision was made to display the data in percentage form, as it eliminates any ambiguity problems that may exist with other forms of presentation such as "high, medium, low".

strategic impact outside the firm. This further highlights the importance of being able to classify these external impacts appropriately.

The data from the cases also picked up another potential external level of impact; business partners. Many firms are now realising the power of the Internet for information sharing and collaboration (Chan and Huff, 1993; Poon and Swatman, 1995; Ellsworth and Ellsworth, 1996). As such, the lines between competitors and allies may become blurred. Also three out of the four case studies are using their Internet expertise to host sites for other companies. These "business partners" are difficult to classify using the "customers, competitors, suppliers" paradigm suggested above, and some provision should be made for them in any revised model.

6.2.2 Internal Levels of Impact

Lymer et al.'s (1997b) internal levels of impact, *organisation* and *task*, proved similarly problematic. Other frameworks don't generally draw a distinction between these two levels (see Section 4.3), mainly just referring to the organisation. The data from the cases, and the literature impacts only rated *communication* and *productivity* as being significant at the task level. No other category of impact rated higher than 3% for either set of data. Also as the percentage of internal impacts decreased from 43% in the literature impacts data, to 31% in the case data, it may be that a distinction between the two internal levels need not be drawn, with *task* being subsumed into *organisation*.

6.3 DISCUSSION OF LYMER ET AL.'S (1997B) CATEGORIES OF IMPACT

Table 6-1 Types of Impact Subsumed by Lymer et al.'s (1997b) Categories

Communication		Communication
		Cost savings
		Efficiency
Information retrieval		Information gathering
		Cost savings
		Efficiency
Productivity		Efficiency
		Revenue generation
		Cost Savings
		Reach
Knowledge management		Management effectiveness
		New or better products or services
Environment		Competitiveness
		Improved image
		Changed nature of work
		Culture

6.3.1 Communication and Information Retrieval

Several frameworks refer to communication impacts (Farbey et al, 1992; Sterne, 1995; Ellsworth and Ellsworth, 1996; Abell and Black, 1997), which lends support for Lymer et al.'s (1997b) *communication* category. However the broad scope of Lymer et al.'s category also subsumes types of impacts that other frameworks consider categories in their own right: cost savings (Rackoff et al., 1985; Sterne, 1995; Cronin, 1995; Ghorab, 1997; Lederer et al., 1997), improved relationships, and the establishment of new market linkages (Chan and Huff, 1993; Sterne, 1995; Bloch et al., 1996; Abell and Black, 1997; Ghorab, 1997; Tallon et al., 1997). These impacts also fall under the umbrella of Lymer et al.'s *information retrieval* category, and were evident in the data from the literature[24] and from the cases.[25]

---

[24] Table 4-2: G2, G9, J4, J14, L1, L4, N17, Q3, R2.

[25] Table 5-9: A3, C4.

As suggested in Sections 4.3 and 4.4.2, Lymer et al.'s (1997b) model may be made more useful if impacts dealing with cost savings, improved relationships, and new linkages were removed from the scope of the *communication* and *information retrieval* categories, and the two categories combined into one *information* category, that would include impacts relating to the retrieval, dissemination, and exchange of information. This has been done with Lederer et al.'s (1997) framework.

Combining the two *communication* and *information retrieval* categories is worthwhile for several reasons. Primarily the reduced scope would make the categories more focused, less ambiguous, and thus more useful to the researcher or practitioner. Also for both sets of impact data *information retrieval* made up less than 10% of the total impacts, significantly less than any other category. Given that the range of the category has been reduced even further, it seems unnecessary to have *information retrieval* as a separate category, when the two similar types of impact can be combined easily.

6.3.2 Knowledge Management

Knowledge management is not picked up by any of the frameworks studied, and its very broad scope does little to enhance the usability of Lymer et al.'s (1997b) model. *Knowledge management* maps to three different types of impacts in Lederer et al.'s (1997) model; new applications, competitiveness, and planning and control (see Figure 4-2). It also subsumes two categories of impact that have been consistently included in other frameworks: management effectiveness (Farbey et al., 1992; Chan and Huff, 1993; Ghorab, 1997; Tallon et al., 1997) and new or better products and services (Rackoff et al., 1985; Chan and Huff, 1993; Grover et al., 1994; Rao et al., 1995; Bloch et al., 1996; Cronin, 1996; Abell and Black, 1997; Ghorab, 1997; Tallon et al., 1997).

Firms that have a high level of impact in the category of *knowledge management* are probably using the Internet in a sophisticated way. This may account for the discrepancy between the two sources of impact data. In the impacts observed from the literature *knowledge management* impacts only made up 13% of the total. In the case data this figure increased to 28%, an indication that the Internet is being used more strategically than in the past. Taking into account the increased importance of the Internet in this area, it is

desirable that *knowledge management* is replaced by something that more accurately, and less ambiguously encompasses the various impacts that the category was trying to address. It is suggested that *knowledge management* be replaced by two categories: *operational innovation*, which includes new or better products or services, or skills; and *strategic innovation*, which includes such things as new alliances or relationships, impacts through collaboration, new ways of doing business, or other strategic impacts that the company has realised through using the Internet. *Strategic innovation* encompasses the relationship impacts previously subsumed by Lymer et al.'s (1997b) *communication* and *information retrieval* categories, as well as impacts from *knowledge management.*

6.3.3 Productivity

Productivity is included in many of the frameworks studied (Farbey et al., 1992; Chan and Huff, 1993; Lucas and Olson, 1994; Gable, 1994; Cronin, 1995; Rao et al., 1995; Ellsworth and Ellsworth, 1996; Tallon et al., 1997), although most studies attach the natural meaning of efficiency to the category. Lymer et al.'s (1997b) definition of productivity goes beyond efficiency to cover revenue generation, costs savings, and reach (see Section 4.3).

This inconsistency seems inexplicable and contributes to making Lymer et al.'s (1997b) model an unwieldy tool. Combined over both sets of data, *productivity* had the highest number of impacts (29%), however many of them were related to either reach (Rackoff et al., 1985; Chan and Huff, 1993; Lucas and Olson, 1994; Cronin, 1995; Sterne, 1995; Bloch et al., 1996; Ellsworth and Ellsworth, 1996), or to cost savings (Rackoff et al. 1985; Cronin, 1995; Sterne, 1995; Bloch et al., 1996; Ghorab, 1997).

It is suggested that the *productivity* category remain, but be given a scope more in line with the other frameworks in the literature, that is productivity impacts should be those that affect the efficiency of the firm or its external stakeholders. *Reach* should form its own category; *cost savings* and *revenue generation* (Grover et al., 1994; Ellsworth and Ellsworth, 1996; Ghorab, 1997) should combine to form a category also.

6.3.4 Environment

Lymer et al.'s (1997b) *environment* category seems to exist as a catch-all for impacts that are not picked up in any of the other categories. Lymer et al.'s definition includes impacts to the physical office, office culture, business strategy, technical orientation, and human relationships. It also subsumes several categories from other frameworks: competitiveness (Porter and Millar, 1985; Farbey et al., 1992; Chan and Huff, 1993; Gable, 1994; Ellsworth and Ellsworth, 1996; Ghorab, 1997), improved image (Sterne, 1995; Bloch et al., 1996), and nature of work (Lucas and Olson, 1994). In the impacts data from the literature, environmental impacts were mainly at the *business contacts* level,[26] competitive impacts at the *industry* level,[27] and culture impacts at the internal levels of *organisation* and *task*.[28] In the case data, *environment* category impacts were culture, or image related.[29]

As business strategy, competitiveness, nature of work, and technical orientation impacts will all be subsumed by either of the new *innovation* categories, Lymer et al.'s (1997b) *environment* category is no longer required and could be replaced with a category combining culture and image.

6.3.5 Other Issues

Lymer et al.'s (1997b) model represents *communication* and *information retrieval* as being "inputs" to the business activity of the organisation, and *knowledge management* and *productivity* as being "outputs" of the business activity. The reasoning for this classification is not described adequately, and it seems to be an unnecessary, even erroneous distinction. The terms are not used in the revised model.

---

[26] Table 4-2: L3, N6, Q2.

[27] Table 4-2: A1, F2, H5, K2, N2, N16, R4.

[28] Table 4-2: B1, C2, D1, E2, G10, H4.

[29] Table 5-9: D4, C7.

6.4 A REVISED MODEL OF INTERNET IMPACTS

With regard to the concerns and issues raised about Lymer et al.'s (1997b) model during this research, a revised model of Internet impacts is proposed in Figure 6-3 A Revised Model of Internet Impacts. A replication of the model is also provided in Appendix K.

Figure 6-3 A Revised Model of Internet Impacts

Revised Model of Internet Impacts		Market impacts			Internal Impacts
		Customers	Suppliers	Business Partners/ Competitors	Organisation
Strengths / Weaknesses	Information				
	Revenue / Costs				
	Productivity				
	Reach / Range				
	Culture / Image				
	Operational Innovation New or better products or services or skills				
	Strategic Innovation New or better relationships / alliances or ways of doing business				
Opportunities					
Threats					

6.4.1 Levels of Impact in the Revised Internet Impacts Model

Modeled on Lymer et al.'s (1997b) framework, the revised Internet impacts model is a two dimensional matrix. The vertical axis is used to indicate categories of impact, which can be analysed at different levels, as depicted on the horizontal axis. The levels of impact include *customers*, *suppliers*, and *business partners and competitors* at the external level, and *organisation,* which is comprised of impacts that are internal to the firm.

6.4.1.1 Customers

Customers are an integral part of all firms, and it is predicted that many of the impacts realised from the Internet will fall at this level. Customers relate with companies in many ways. They use e-mail to facilitate more effective communication, they buy products online with their credit cards, and give useful feedback to a company on its products. Firms are able to reach a much broader population of potential customers with the Internet, by tracking a customer's movements around the Website a firm can build a picture of the customer's likes and dislikes, they can also provide a faster and more effective service to the customer in many ways.[30]

6.4.1.2 Suppliers

Suppliers also play an important role in the effective functioning of many firms. The Internet can make an impact in various ways; time and cost savings can be realised by integrating various online ordering systems between companies, e-mail negotiations with suppliers can shorten negotiations, as well as providing an electronic record of those negotiations. More effective communication may also lead to better relationships with suppliers.

6.4.1.3 Business Partners and Competitors

Business partners and competitors are becoming a very important part of the Internet as more firms start to take advantage of the benefits that it can provide. Being online first, or having the best Website can provide an improved relative advantage over competitors. A company with its own Web server can also gain significant pecuniary impacts through hosting sites for other companies. Further, as companies realise the advantages that can be gained through collaboration (Poon and Swatman, 1995), then virtual alliances may be formed for the gain of all of the firms involved. In this way the line between competitors and business partners may become blurred.

---

[30] All examples of impacts in Section 6.4 are sourced from either the literature or the case data.

6.4.1.4 Organisation

Organisation impacts include all of those impacts which do not affect the external environment of the firm. It includes task based impacts; increased productivity, the assimilation of new skills, enhanced communication within the firm through e-mail, and wider organisational impacts; changes to the culture of the firm through the use of the Internet, cost reductions through lower phone bills, and many others.

6.4.2 Categories of Impact in the Revised Internet Impacts Model

6.4.2.1 Information

The *information* category includes impacts that relate to the exchange, dissemination, and retrieval of information, as well as impacts that arise due to communication between parties. *Information* impacts include such things as the ability to receive and act on useful feedback from customers, improved communication with suppliers and competitors, improved internal communications, and more effective research.

Information does not include cost savings or efficiency impacts, nor does it include impacts relating to better relationships through enhanced communication. These impacts are all covered in other categories.

6.4.2.2 Revenues and Costs

Revenue generation and cost savings impacts are important to most companies (Lederer et al., 1997). Impacts in this category include cost savings due to lower communication costs, reduced travel costs as a result of tools such as video conferencing, online sales through the Internet, or the ability to buy products overseas cheaper than may be possible in the home country.

6.4.2.3 Productivity

Productivity improvements have been one of the predominant reasons for implementing information systems and technology in the past (Martin et al., 1994). Likewise many firms have adopted the Internet for the productivity benefits that they expect to reap (Iacovou et

al., 1995). In this model *productivity* is synonymous with efficiency. Any impacts that enhance or degrade the efficiency of the firm should be mapped to this category. Some examples are getting the product to the market sooner, speeding up process cycles, faster and more efficient communication with customers and suppliers, less need to return to the office because the documents needed are all online, and more effective use of work time.

6.4.2.4 Reach and Range

Reach impacts are those which affect who can access information through an organisation's IT platform. *Range* impacts deal with the types of information services that can be directly shared through an organisation's IT platform (Martin et al., 1994, p. 80). Examples include expansion into new business areas, increased visibility, increase in international client base, penetration into foreign markets, and generating international awareness of the business.

6.4.2.5 Culture and Image

Culture and image impacts include such things as using the Internet to create a good, or hi-tech image for the firm, improved job satisfaction, changes in organisational structure, and remote offices feeling closer. Most impacts in this category are likely to be at the *customer* level for *image*, and the *organisational* level for *culture* impacts.

6.4.2.6 Operational Innovation: New or Better Products, Services or Skills

Operational innovation: new or better products, services or skills is likely to capture many important impacts. The category is intended to deal with any type of new or improved operation or product that the firm develops, any new or improved services that it can provide to its *customers, suppliers, or business partners*, and any new skills that may be obtained by member of the firm as a result of the Internet. Examples include providing web page hosting, taking the company further along the IT learning curve, providing online transaction systems, or any new online service for customers, product or services differentiation, and improved customer service.

6.4.2.7 Strategic Innovation: New or Better Relationships, or Alliances or Ways of Doing Business

Strategic innovation: new or better relationships or alliances or ways of doing business also deals with new ways of using the Internet but focuses more on strategic impacts than *operational innovation* does. The category includes impacts such as enabling customer intimacy, improved investor and customer relations, building rapport through interactivity, the ability to bypass brokers, the shortening of distribution channels, improved competitive advantage, and other things which affect the firm's relationships with its external stakeholders, or impact the firm's strategic position.

6.4.2.8 Opportunities and Threats

The seven previous categories of impact all deal with consequences of Internet use. Every impact either strengthens the firm's position somehow, or weakens it somehow. If it did neither then it would not be affecting the firm at all, and thus would not be an impact. Given this reasoning, and also the observation[31] that Lymer et al.'s (1997b) model made no provision for the various threats that each firm was facing, nor for opportunities that were uncovered during the analysis of the interview data, it was considered that the incorporation of the SWOT (strengths, weaknesses, opportunities, threats) analysis tool would be a most useful addition to the revised model.

Each impact is either a strength or a weakness for the firm, and any threats or opportunities that are uncovered during analysis can easily be mapped onto the model to highlight any danger areas, or areas where there is scope for improvement. Both threats and opportunities are sources of potential impacts.

---

[31] Section 5.6.1.

6.5 TESTING THE REVISED MODEL OF INTERNET IMPACTS

6.5.1 Impacts from the Literature

Figure 6-4 Mapping Impacts from the Literature (Table 4-2) to the Revised Model

Revised Model of Internet Impacts		Market impacts: Customers	Market impacts: Suppliers	Market impacts: Business Partners/ Competitors	Internal Impacts: Organisation		
Strengths / Weaknesses	Information	G5 O2 P7	P8	N3 R7	E5 E7 M2	9	8%
	Revenue / Costs	F1 J11 N13 Q4 Q7 R11	J13		G1 H8 J1 J3 J13 L7 N5 P11 R9 R10	17	14%
	Productivity	G3 G7		H3	C4 E1 I2 I3 P1 P2 P4 R3 R5	12	10%
	Reach / Range	L5 L6 M1 N4 N10 N14 O1 P3 P5 P6 Q5 Q6		E3 J14		14	12%
	Culture / Image	L3 N6 Q2			B1 C2 E2 G10 H1 H2 R12	10	8%
	Functional Innovation New or better products or services	G6 G8 H7 J12 L2 N11 N15 P9 P10 R6	K1 Q8	F2 K1 N2 N16	C3 A3 E4 G6 J5 J6 Q1 Q8 Q11 R1 R8	27	23%
	Strategic Innovation New or better relationships / alliances or ways of doing business	G2 L4 N17 R2	N1 Q9 Q10 J7 N12	A1 E1 D1 G9 J4 J7 J8 J9 J10 K2 L1 Q3 R4	I1 J2	24	20%
Opportunities						0	0%
Threats			H5 Q9	H5 H9 H10	H4 H6	7	6%
		40	11	25	44	120	
		33%	9%	21%	37%		100%

All impacts were able to be classified in terms of the new model, and the classifications required less effort than those of Lymer et al.'s (1997b) model. The two *innovation* categories were the most heavily impacted, which is interesting as the *knowledge management* category from Lymer et al.'s model had limited impacts from the literature. Many of the impacts in these two categories have come from what was Lymer et al.'s *environment* category.

Information was the least impacted category in the model, with 8% of all impacts. Revenue and costs had 17% of impacts, and productivity had 12%. This is a much more even distribution than that in Lymer et al.'s (1997b) model (Figure 6-1), and indicates the

usefulness of distinguishing between communication, costs, and productivity impacts. *Reach and range,* and *culture and image*, both had medium levels of impacts.

Operational innovation: new or better products, services or skills, had the most impacts, and it would seem that this was a major omission from Lymer et al.'s (1997b) model. *Strategic innovation* also had a very high number of impacts, mainly focused at the *business partners and competitors* level. Both of these categories were classified under either *knowledge management* or *environment* in Lymer et al.'s model, and as such could not have been picked up without a highly focused analysis. It is suggested that these are categories that are likely to see more impacts as firms start to employ the Internet in more sophisticated ways.

The major levels of impact were *customers*, with 33%, and *organisation*, with 37%. Most *organisation* impacts were focused in the *revenue and costs, productivity, and operational innovation* areas. The only significant impacts that could have been classified at Lymer et al.'s (1997b) *task* level occurred in the *productivity* category. This seems to justify the exclusion of *task* impacts from the new model.

Business partners and competitors made up 21% of impacts, with the only significant impacts being in the *strategic innovation* category. *Suppliers* made up only 9% of impacts, also mainly *strategic innovation* types. Notwithstanding the limited number of impacts discovered in these categories, it is still felt that having three levels of external impact is justified. Differentiating between the three levels conforms with other frameworks of impact (Porter, 1980; Gable, 1994; Abell and Black, 1997), and is useful for analysis. As more firms in each industry start to come online, it is felt that the distinction between *suppliers* and *business partners and competitors* will become important.

No *opportunities* were picked up in the data from the literature; this was expected as it was not the purpose of the literature review to find opportunities for firms to utilise the Internet. The category has been included as an additional analysis tool. Several *threats* were discovered however.

6.5.2 Impacts from the Cases

As well as mapping impacts from each case onto the revised model, opportunities that were picked up during the analysis (Chapter Five) are also listed in Table 6-2 and mapped to the model.

Table 6-2 Opportunities for the Internet from the Case Studies

Case 1
AO1 take advantage of information provided online by suppliers AO2 use cookies to customise clients' experience AO3 use cookies to track visitor's movements AO4 database solution for the need to re-key data
Case 2
BO1 opportunity to add value to existing customers BO2 transaction analysis reports to customers
Case 3
CO1 make site less static CO2 online ordering with suppliers
Case 4
DO1 document imaging DO2 cut down on paper and printing costs

Figure 6-5 Mapping Impacts from the Cases (Tables 5-9 and 6-1) to the Revised Model

Revised Model of Internet Impacts		Market impacts			Internal Impacts		
		Customers	Suppliers	Business Partners/ Competitors	Organisation		
Strengths / Weaknesses	Information	G5 O2 P7	P8	N3 R7	E5 E7 M2	9	8%
	Revenue / Costs	F1 J11 N13 Q4 Q7 R11	J13		G1 H8 J1 J3 J13 L7 N5 P11 R9 R10	17	14%
	Productivity	G3 G7		H3	C4 E1 I2 I3 P1 P2 P4 R3 R5	12	10%
	Reach / Range	L5 L6 M1 N4 N10 N14 O1 P3 P5 P6 Q5 Q6		E3 J14		14	12%
	Culture / Image	L3 N6 Q2			B1 C2 E2 G10 H1 H2 R12	10	8%
	Operational Innovation New or better products or services	G6 G8 H7 J12 L2 N11 N15 P9 P10 R6	K1 Q8	F2 K1 N2 N16	C3 A3 E4 G6 J5 J6 Q1 Q8 Q11 R1 R8	27	23%
	Strategic Innovation New or better relationships / alliances or ways of doing business	G2 L4 N17 R2	N1 Q8 Q10 J7 N12	A1 E1 D1 G9 J4 J7 J8 J9 J10 K2 L1 Q3 R4	I1 J2	24	20%
Opportunities						0	0%
Threats			H5 Q9	H5 H9 H10	H4 H6	7	6%
		40	11	25	44	120	
		33%	9%	21%	37%		100%

All impacts were able to be classified in terms of the new model. The categories most impacted were *information,* and *revenue and costs. Information* impacts were felt at the supplier and the customer level only. This was expected as the impacts previously modeled to *communication* have now been encompassed by *productivity.* The *revenue and costs* impacts were felt at the *organisation* and *customer* levels. The *productivity, reach and range, culture and image*, and *operational innovation* categories each had two impacts. None of the impacts were at the *supplier* level, and only *operational innovation* had an impact at the *business partners and competitors* level. *Strategic innovation* had four impacts, two in each of *customers* and *suppliers.*

Customers was the most heavily impacted level, with eleven impacts. This was followed by *organisation* and *suppliers* with seven and six impacts respectively. *Business partners* had two impacts.

Categories for *threats* and *opportunities* seem to be a useful addition to the model with four and ten impacts respectively. *Opportunities* especially can be used to help a firm focus on the areas that require more attention, or further bolster areas that are strong.

6.6 CONCLUSION

This chapter has consolidated suggestions for improvement to Lymer et al.'s (1997b) model, which were proposed in previous chapters. The main objection to Lymer et al.'s model was that it suffered from trying to fit too much information into single categories, and important impacts such as reach and range, new products and services, and new relationships were overlooked by the model These weaknesses were addressed by the revised model of Internet impacts that was proposed in Section 6.4. This revised model was partially validated by using it to map and analyse impacts gathered from a literature review and four case studies.

Chapter Seven discusses and summarises the findings of this research as well as outlining the limitations of the study, implications for researchers and practitioners, and scope for future research.

7. CONCLUSION

7.1 SUMMARY

This research set out to test and possibly revise Lymer et al.'s (1997b) model of Internet impacts. The model was tested through a comprehensive comparison of similar and conflicting frameworks in the literature, as well as applying it to impacts from the literature and from four case studies.

Suggestions for improvement to Lymer et al.'s (1997b) model were made at each stage, and any other issues were also raised. All of these suggestions and issues were consolidated in Chapter Six to build a revised model of Internet impacts.

The main objection to Lymer et al.'s (1997b) model was that it suffered from trying to fit too much information into single categories, and important impacts such as reach and range, new products and services, and new relationships were overlooked by the model. This objection was addressed in the revised model.

The revised model was partially validated by using it to map and analyse impacts gathered from a literature review and four case studies, however more validation with new data needs to be performed to ensure the robustness of the revised model.

7.2 LIMITATIONS OF THE RESEARCH

It must be stressed that only a preliminary evaluation and validation has been performed on the revised model. In a sense, the revised model was tested by the very data that was used to create it. New data should be used to determine whether the various categories and levels of impact are stable enough to be effectively used for cross business analysis of the impacts of the Internet on small firms. As companies start to use the Internet in more innovative ways, impacts not yet considered may come to light, and revision of the model may be necessary, although this research has considered many existing future oriented frameworks.

It may also be that further analysis of the revised model reveals existing impacts that are unable to be classified in any of the categories. The model is thought to be comprehensive, but not necessarily exhaustive. Also the purpose behind several of the category definitions and combinations may be questioned. For example there is an argument for putting cost savings impacts in the same category as efficiency impacts, it may also be that combining reach and culture impacts was not the most elegant solution. It may never be said that any model is perfect. Miles and Huberman (1994) performed a study where 25 subjects were given research data with which to construct a matrix. Every subject created a distinctly different, yet valid matrix. The aim of this thesis was not to build a perfect model, but to build a more helpful one (Miles and Huberman, 1994).

Only one person from each firm was interviewed, which necessarily calls the data gathered into question, as differing viewpoints may yield vastly different results. In one firm, Lederer et al.'s (1997) questionnaire was administered to two employees; the Managing Director, and the Systems Supervisor. The results were similar except that the managing director ranked productivity last, and the systems supervisor ranked it first. This is an illustration of how different perspectives can colour perceptions; the Managing Director sees the competitiveness and cost savings impacts of the Web rather than the productivity improvements that the employees on the "coal face" notice.

Obtaining only one perspective is a weakness of this study, but only as it relates to the analysis of the impacts on each firm, which was not a major goal of the research. When comparing the results from Lymer et al.'s (1997b) model to Lederer et al.'s (1997) model it was necessary that the raw data came from the same source.

Finally, it must be noted that for logistical reasons, all of the firms chosen for the research were small businesses in the Christchurch area. Thus the case data may not give results that are representative of firms worldwide or in other parts of New Zealand. More testing needs to be performed on the model, both nationally and internationally, before it can be used with confidence.

7.3 IMPLICATIONS FOR RESEARCHERS AND PRACTITIONERS

7.3.1 Implications For Researchers

The revised model of Internet impacts makes valuable contributions by respecifying the domain for several of Lymer et al.'s (1997b) levels and categories of impact, and with the addition of cells to complete a limited SWOT analysis.

It was only after a thorough review of the literature and by determining where other categories of impact would fit into Lymer et al.'s (1997b) model, that impacts were able to be classified easily in terms of Lymer et al.'s model. Without that guide, any mapping and subsequent useful analysis would be very difficult to perform. Clarifying the scope of Lymer et al.'s categories, and splitting categories into more than one where necessary should enhance the usability and usefulness of the model.

Distinguishing between *customers, suppliers,* and *business partners and competitors* seems to be a useful addition, although more validation needs to be performed before it can be said with certainty that *suppliers* impacts has a wide enough scope to justify a category of its own. It may also be the case in the future that *business partners* and *competitors* need to be split into separate categories. The impacts discovered from the literature, and from the cases did not give support to distinguishing between the two, but it is suggested that as more firms come online and realise the strategic advantages of collaboration, *business partners* and *competitors* will become more distinct.

Organisation has a large percentage of impacts in both sets of data, however the decision to integrate *task* impacts into this category seems valid as *task* impacts seem to be mainly *efficiency* based (see Figure 4-3).

Similarly, extracting *revenue and cost, reach and range,* and *culture and image* impacts from the multiple categories that they were previously classified in Lymer et al.'s (1997b) model should be useful; however most *reach and range* impacts are focused at the

customer level. More validation needs to be performed to check whether *reach and range* has impacts over all levels.

Distinguishing *new or better products or services* from *knowledge management*, is a major contribution; in the literature data the highest percentage of all impacts (23%) fell under this category. *Strategic innovation* is also a useful addition. New relationships, alliances, and collaboration is likely to become a more important part of doing business on the Internet in the future (Poon and Swatman, 1995). Having these impacts classified under *environment* or *communication* as in Lymer et al.'s (1997b) model would weaken the analytical usefulness of the model.

The addition of *opportunities* and *threats* to the model has also proven to be worthwhile. In the cases especially, many opportunities were identified from the interviews, but were unable to be classified in terms of Lymer et al.'s (1997b) model. The revised model addresses this issue by incorporating a proven and effective tool into its design.

7.3.2 Implications For Practitioners

Lymer et al.'s (1997b) model has use as either a retrospective analysis tool, or a planning tool for practitioners (Lymer et al., 1997a). The revisions made to Lymer et al.'s model potentially make the framework even more suited to these tasks. One of the main purposes of Lymer et al.'s (1997b) model is to "segment impacts in such a way that encourages focus on where impacts are most significant, or where potential is being underexploited" (Lymer et al., 1997a, p. 161). Redefining the scope of Lymer et al.'s (1997b) categories and replacing several of them with different categories helps to segment impacts in a more useful way.

It should be noted that many impacts can potentially fall into more than one category. For example online transactions could be classified under *reach*, *productivity*, *revenue*, *operational innovation*, or *strategic innovation*. It is not intended that there be one correct way to use the model. Practitioners are likely to classify an impact under the category that they feel is important to the firm. The aim of the research was to produce a helpful model, and that necessarily involves some flexibility (Miles and Huberman, 1994). There are no

rigid rules for the application of the model, researcher and practitioners alike are encouraged to find new and innovative ways in which the model can be used. Used in this way, the revised model should have a positive impact on the field of IS success.

7.4 CONCLUDING COMMENTS

This research represents a significant contribution to the area of Internet impacts on small firms. Lymer et al.'s (1997b) Internet impacts model was compared with existing frameworks of IS impact and effectiveness in both large and small firms, and also applied to four small firms. This gave insights into to the utility and usefulness of the model for analysing the impacts of the Internet on small firms.

These insights provided the basis for a revised model of Internet impacts. The revised model was tested with the same data used to evaluate Lymer et al.'s model of Internet impacts. The revised model was significantly easier to use, and its more focused categories contributed to enhancing the analytical capabilities of the model. With more validation, the revised model of Internet impacts is set to make a useful contribution to the research on this topic.

REFERENCES

Abell, W. and Black, S. (1997) *Business Use of the Internet in New Zealand: A Follow-Up Study*, http://www.lincoln.ac.nz/ccb/staff/abell/webnet.htm

Angehrn, A.A. (1997) The Strategic Implications of the Internet, *Proceedings from the 5th European Conference on Information Systems*, Cork, Ireland, 3, pp. 1163-1173.

Angelides, M. (1997) Implementing the Internet For Business: A Global Marketing Opportunity, *International Journal of Information Management*, 17(6), pp. 405-419.

Atkins, M.H. (1994) IT and IS Perspectives on Business Strategies, *Journal of Strategic Information Systems,* 3(2), pp. 123-135.

Bailey, J.E. and Pearson, S.W. (1983) Developing A Tool For Measuring and Analysing Computer User Satisfaction, *Management Science,* 29(5), pp. 530-545.

Baroudi, J.J. and Orlikowski, W.J. (1988) A Short Form Measure of User Information Satisfaction: A Psychometric Evaluation and Notes on Use, *Journal of Management Information Systems*, 4(4), Spring, pp. 44-59.

Benbasat, I., Goldstein, D.K. and Mead, M. (1987) The Case Research Strategy in Studies of Information Systems, *MIS Quarterly*, 11(3), pp. 369-386.

Benjamin, R. and Levinson, E. (1993) A Framework for Managing IT-Enabled Change, *Sloan Management Review*, 34(4), Summer, pp. 23-33.

Bennet, R. (1997) Export Marketing and the Internet: Experiences of Web Site Use and Perceptions of Export Barriers Among UK Businesses, *International Marketing Review*, 14(5), pp. 324-344.

Bloch, M., Pigneur, Y. and Segev, A. (1996) *On the Road of Electronic Commerce: A Business Value Framework, Gaining Competitive Advantage and Some Research Issues*, http://www.hec.unil.ch/mbloch/docs.htm

Bollard, A. (1989) *Small Businesses in New Zealand*, Allen and Unwin, Port Nicholson Press, Wellington.

Brancheau, J.C., Janz, B.D. and Wetherbe, J.C. (1996) Key Issues in Information Systems Management: 1994-1995 Delphi Results, *MIS Quarterly*, 20(2), June, pp. 225-242.

Cappel, J.J. and Myerscough, M.A. (1996) World Wide Web Uses for Electronic Commerce: Toward a Classification Scheme, *AIS Conference*, August.

Carlson, P., Kahn, B. and Rowe, F. (1997) Organisational Impacts of New Communication Technology: A Cross-Cultural Comparison of Cellular Phone Adoption in France

and the US, *Proceedings from the 5th European Conference on Information Systems,* Cork, Ireland, 1, pp. 337-352.

Cavaye, A.L.M. (1996) Case Study Research: A Multi-faceted Research Approach For IS, *Information Systems Journal*, 6, pp. 227-242.

Chan, Y.E. and Huff, S.L. (1993) Strategic Information Systems Alignment, *Business Quarterly*, 58(1), Autumn, pp. 51-55.

Cockburn, C. and Wilson, T.D. (1996) Business Use of the World Wide Web, *International Journal of Information Management*, 16(2), pp. 83-102.

Cronin, B., Overfelt, K., Fouchereaux, K., Manzvanzvike, T., Cha, M. and Sona, E. (1994) The Internet and Competitive Intelligence: A Survey of Current Practice, *International Journal of Information Management*, 14, pp. 204-222.

Cronin, M. J. (1995) *Doing More Business on the Internet*, Van Nostrand Reinhold, New York.

Damanpour, F. (1991) Organizational Innovation: A Meta-analysis of Effects of Determinants and Moderators, *Academy of Management Journal*, 34(3), pp. 555-590.

Davenport, H. (1996) Marketing on the Internet, *Journal of Targeting, Measurement and Analysis for Marketing*, 4(3), pp. 261-269.

DeLone, W.H. and McLean, E.R. (1992) Information Systems Success: The Quest for the Dependent Variable, *Information Systems Research*, 3(1), March, pp. 60-95.

Duchessi, P., O'Keefe, R. and O'Leary, D. (1993) A Research Perspective: Artificial Intelligence, Management and Organisations, *Intelligent Systems in Accounting, Finance and Management*, 2, pp. 151-159.

Eisenhardt, K.M. (1989) Building Theories from Case Study Research, *Academy of Management Review*, 14(4), October, pp. 532-550.

Eisenhardt, K.M. (1991) Better Stories and Better Constructs: The Case for Rigor and Comparative Logic, *Academy of Management Review*, 16(3), July, pp. 620-627.

Ellsworth, J.H. and Ellsworth M.V. (1996) *Marketing on the Internet: Multimedia Strategies for the WWW*, John Wiley, New York, http://www.oak-ridge.com/orr.html

Farbey, B., Land, F. and Targett, D. (1992) Evaluating Investments in IT, *Journal of Information Technology,* 7(2), pp. 109-122.

Farbey, B., Targett, D. and Land, F. (1994) Matching an IT Project with an Appropriate Method Of Evaluation: A Research Note On 'Evaluating Investments In IT', *Journal of Information Technology,* 9(3), pp. 239-243.

Fried, L. (1993) Current IT Trends and Business Issues: An Executive Briefing, *Information Strategy*, 9(3), pp. 16-25.

Gable, G.G. (1994) Integrating Case Study and Survey Research Methods: An Example in IS, *European Journal of Information Systems,* 3(2), pp. 112-126.

Ghorab, K.E. (1997) The Impact of Technology Acceptance Considerations on System Usage and Adopted Level of Technological Sophistication: An Empirical Investigation, *International Journal of Information Management,* 17(4), pp. 249-259.

Grover, V., Segars, A.H. and Durand, D. (1994) Organisational Practice, Information Resource Development and Systems Success: A Cross Cultural Survey, *Journal of Strategic Information Systems*, 3(2), pp. 85-106.

Hale, A.J. and Cragg, P.B. (1996) Measuring Strategic Alignment in Small Firms, *Proceedings from the 1996 Information Systems Conference of New Zealand*, October 30-31, pp. 127-134.

Hamill, J. (1997) The Internet and International Marketing, *International Marketing Review*, 14(5), pp. 300-323.

Hamilton, B. and English, J.W. (1993) *How to Organise and Operate a Small Business in New Zealand*, 2nd edition, Allen & Unwin, Wellington, New Zealand.

Hart, S.J. (1991) A First-time User's Guide to the Collection and Analysis of Interview Data From Senior Managers, in Smith, N.C. and Dainty (eds.), *Management Research Handbook*, Routledge, pp. 190-203.

Hartley, J.F. (1994) Case Studies in Organizational Research, in Cassell, C. and Symon, G. (eds.), *Qualitative Methods in Organizational Research*, Sage, London, pp. 208-229.

Hiltz, S.R. (1988) Productivity Enhancement From Computer Mediated Communication: A Systems Contingency Approach, *Communications of the ACM,* 31(12), pp. 1438-1454.

Hitt, L. and Brynjolfsson, E. (1996) Productivity, Business Profitablility, and Consumer Surplus: Three Different Measures of Information Technology Value, *MIS Quarterly*, 20(2), pp. 121-142.

Ho, J.K. (1996) *Evaluation of 1000 Commercial Websites*, http://www.uk.edn/~jimho/

Huber, G. (1990) A Theory of the Effects of Advanced Information Technologies on Organisational Design, Intelligence and Decision-Making, *Academy of Management Review*, 15 (1), pp. 47-71.

Iacovou, C.L., Benbasat, I. and Dexter, A. (1995) Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology, *MIS Quarterly*, 19(4), December, pp. 466-485.

Kaplan, B. and Duchon, D. (1988) Combining Qualitative and Quantitative Methods in Information Systems Research: A Case Study, *MIS Quarterly*, 12(4), pp. 571-856.

Keen, P.G.W. (1980) MIS Research: Reference Disciplines and a Cumulative Tradition, *Proceedings of the First Conference on Information Systems*, pp. 9-18.

King, N. (1994) The Qualitative Research Interview, in Cassell, C. and Symon, G. (eds.), *Qualitative Methods in Organizational Research*, Sage, London, pp. 14-36.

Kwon, T.A. and Zmud, R.W. (1987) Unifying the Fragmented Models of Information Systems Implementation, in Boland, R.J. and Hirscheim, R.A. (eds.), *Critical Issues in Information Systems Research*, Wiley, Chichester, pp. 227-251.

LeCompte, M.D. and Goetz, J.P. (1982) Problems of Reliability and Validity in Ethnographic Research, *Review of Educational Research*, p. 52.

Lederer, A.L. and Mirani, M. (1995) Anticipating the Benefits of Proposed Information Systems, *Journal of Information Technology*, 10(3), pp. 159-169.

Lederer, A.L., Mirchandani, D. and Sims, K. (1997) The Link Between Information Strategy and Electronic Commerce, *Journal of Organisational Computing and Electronic Commerce*, 7(1), pp. 17-34.

Lee, H.G. and Clark, T.H. (1996) Market Process Reengineering Through Electronic Market Systems: Opportunities and Challenges, *Journal of Management Information Systems*, 13(3), pp. 113-136.

Lim, W.L.L. (1995) *An Exploratory Study on Business Use of the Internet in New Zealand*, Dissertation, Lincoln University, New Zealand.

Lucas, H. and Olson, M. (1994) The Impact of IT on Organisational Flexibility, *Journal of Organisational Computing*, 4(2), pp. 155-176.

Lymer, A., Johnson, R. and Baldwin, A. (1997a) The Internet and the Small Business: The Study of Impacts, *Proceedings from the 5th European Conference on Information Systems*, Cork, Ireland, 1, pp. 145-163.

Lymer, A., Johnson, R. and Baldwin, A. (1997b) The Internet and the Small Business: The Study of Implementation Impacts and Issues, *Proceedings from the 2nd International Workshop on Telework*, Amsterdam, September 2-5.

Marshall, C. and Rossman, G.B. (1995) *Designing Qualitative Research*, 2nd edition, Sage, California.

Martin, E.W., DeHayes, D.W., Hoffer, J.A. and Perkins, W.C. (1994) *Managing Information Technology: What Managers Need to Know*, 2nd edition, Macmillan Publishing Company, New Jersey.

McKinnon, J. (1988) Reliability and Validity in Field Research: Some Strategies and Tactics, *Accounting, Auditing and Accountability*, 1(1), pp. 34-54.

Mehrtens, J.M. (1997) *Adoption of the Internet by Small Firms*, http://members.xoom.com/uocstuff/

Miles, M. and Huberman, A. (1984) *Analysing Qualitative Data: A Sourcebook for New Methods*, Sage, California.

Miles, M. and Huberman, A. (1994) *Qualitative Data Analysis: An Expanded Sourcebook*, 2nd edition, Sage, California.

Naylor, J. and Williams, J. (1994) The Successful Use of IT in SME's on Merseyside, *European Journal of Information Systems,* 3(1), pp. 48-56.

O'Connor, G., O'Keefe, R.M. and Kung, H.J. (1997) Early Adopters of the Web as a Retail Medium: Small Company Winners and Losers, Working Paper, Brunel University, England.

Philip, G. and Pederson, P. (1997) Interorganisational Information Systems: Are Organisations in Ireland Deriving Strategic Benefits From EDI?, *International Journal of Information Management,* 17(5), pp. 337-357.

Poon, S. and Swatman, P. (1995) Small Business Alliances: A Framework for Internet-Enabled Strategic Advantage, Working Paper, Monash University, Australia.

Porter, M.E. (1980) *Competitive Strategy*, The Free Press, New York.

Porter, M.E. and Millar, V.E. (1985) How Information Gives You Competitive Advantage, *Harvard Business Review*, July-August, pp. 149-160.

Prescott, M. and Van Slyke, C. (1996) *The Internet as an Innovation*, http://www.hsb.baylor.edu/ramsower/ais.ac.96/papers/PRESCOTT.html

Rackoff, N., Wiseman, C. and Ullrich, W. (1985) Information Systems For Competitive Advantage: Implementation of a Planning Process, *MIS Quarterly*, 9(4), pp. 285-294.

Rao, H., Pegels, C., Salam, A., Hwang, K. and Seth, V. (1995) The Impact of EDI Implementation Commitment and Implementation Success on Competitive Advantage and Firm Performance, *Information Systems Journal,* 5(3), pp. 185-202.

Raymond, L. (1985) Organizational Characteristics and MIS Success in the Context of Small Business, *MIS Quarterly*, 9(1), March, pp. 37-51.

Russell, B. (1997) Big Increase Predicted in Internet Shopping, *Tuanz Topics*, 7(10), November, p. 29.

Seddon, P.B. (1997a) A Respecification and Extension of the DeLone and McLean Model of IS Success, *Information Systems Research*, 8(3), September, pp. 240-253.

Seddon, P.B. (1997b) *The IS Effectiveness Matrix: a Taxonomy of IS Effectiveness Measures*, http://www.dis.unimelb.edu.au/staff/peter/ISEffectivenessmatrix.html

Statistics New Zealand (1998) *Labour Market Statistics 1997*, Wellington.

Sterne, J. (1995) *World Wide Web Marketing: Integrating the Internet into Your Marketing Strategy*, John Wiley, New York, http://www.targeting.com

Tallon, P., Kraemer, K. and Gurbaxani, V. (1997) A Multidimensional Assessment of the Contribution of Information Technology to Firm Performance, *Proceedings from the 5th European Conference on Information Systems,* Cork, Ireland, 2, pp. 846-867.

Van Wegen, B. and de Hoog, R. (1996) Measuring The Economic Value Of Information Systems, *Journal of Information Technology,* 11(3), pp. 247-260.

Venkatraman, N. (1994) IT-enabled Business Transformation: From Automation to Business Scope Redefinition, *Sloan Management Review*, December, pp. 73-87.

Ward, J., Taylor, P. and Bond, P. (1996) Evaluation and Realisation of IS/IT Benefits: An Empirical Study of Current Practice, *European Journal of Information Systems*, 4(4), pp. 214-225.

Weil, P. and Olson, W.H. (1989) Managing Investment in IT: Minicase Examples and Implications, *MIS Quarterly,* 13(1), pp. 3-17.

Welshe, J. and White, J., (1981) A small business is not a little big business, *Harvard Business Review*, July-August, 59(4), pp. 18-32.

Willcocks L. and Lester, S. (1991) Information Systems Investments: Evaluation at the Feasibility Stage of Projects, *Technovation,* 11(5), pp. 283-302.

Yin, R. K. (1994) *Case Study Research: Design and Methods*, 2nd edition, Sage, California.

Zinatelli, N. and Cavaye, A. (1992) Case Study Research in Information Systems: Strategies for Success and Pitfalls to Avoid, *New Zealand Journal of Computing*, 5(1), pp. 17-22.

TABLE OF APPENDICES

APPENDIX A: DESCRIPTION OF LYMER ET AL.'S (1997B) INTERNET IMPACTS MODEL

The following descriptions are sourced from Lymer et al. (1997b).

LEVELS OF IMPACT

Business Contacts

This describes all of the external individuals and organizations with whom a company communicates. These include customers, suppliers, governmental agencies, competitors, banks, etc. The Web can enable companies to extend their geographical reach, and enable customers to purchase products from organisations that would otherwise be impractical to trade with.

Industry

The industry within which a business operation exists, may be affected if companies start to use the Web as a business tool. Regulatory bodies and professional institutes will be able to communicate, disseminate, and retrieve information from members of the industry that are on-line. More incentives may be also created to encourage joint ventures with competitors, developing mutual strategies as opposed to engaging in competition.

Organisation

Organisational impacts are those that affect the organisation as a whole. These impacts are internal to the organization rather than the external impacts between the firm and its commercial environment. Examples include labour changes arising, altering of

management operations and roles, change in communication flows, change in the physical work environment.

Task

Task is defined as the individual processes that are carried out within the organisation. It includes assessing the day to day impacts affecting employees and how they work. Has the Web empowered workers to take on new tasks, or do the workers waste their time reading newsgroups?

CATEGORIES OF IMPACTS

Communication

The Internet opens up many new opportunities for communication, many of which are cheaper and more efficient than traditional methods. Because of this, companies may notice strong impacts in this area.

Information Retrieval

The Internet is a formidable source for information. Industry and general business data may be made more accessible through the use of the Internet.

Knowledge Management

This category is mainly concerned with using the Internet for education, gathering expertise, and knowledge sharing.

Productivity (Use of Knowledge)

Companies may find that the Internet enables them to undertake some activities quicker, easier, and for less cost. Productivity includes efficiency and effectiveness impacts. It mainly relates to improvements in the use of business knowledge and expertise.

Environment

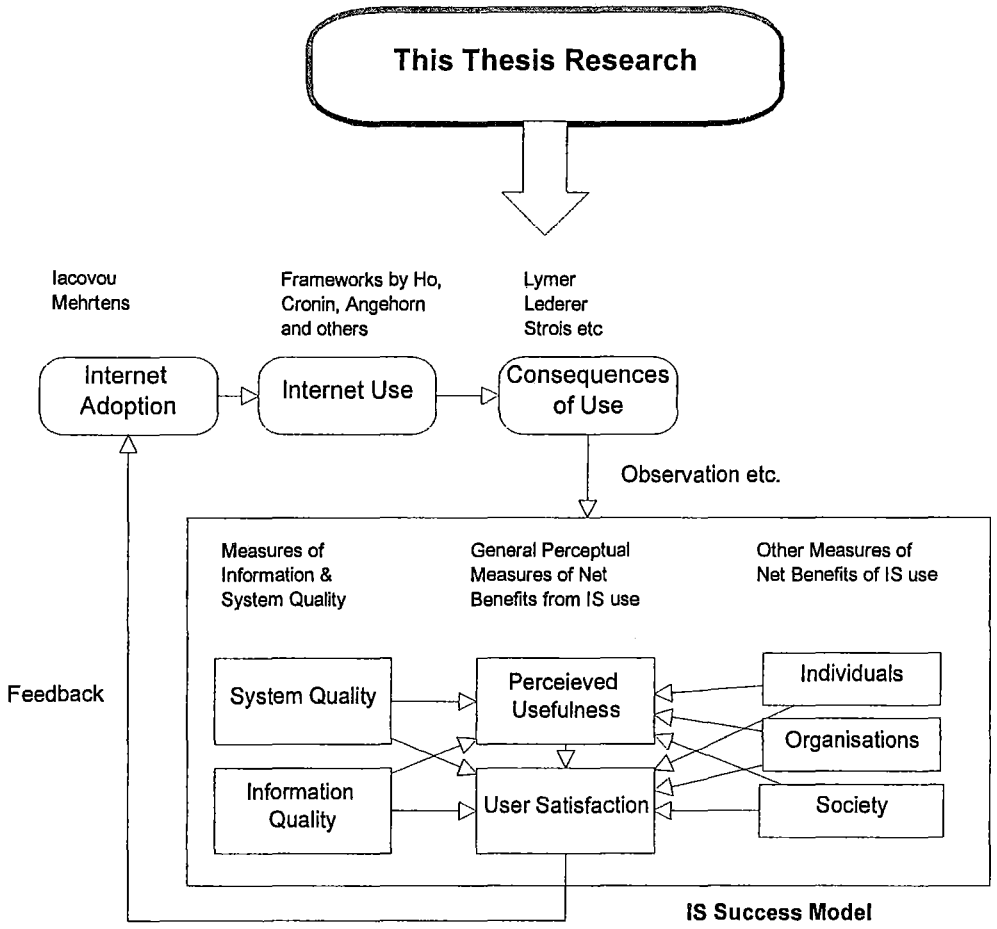
Environmental issues are difficult to quantify but they will be present when changing business processes using Internet technology. Factors such as the physical office and the office culture, business strategy, technical orientation, and human relationships are susceptible to change.

Figure A-1 Lymer et al.'s (1997) Internet Impacts Model

Matrix Model Of Internet Impacts

Categories Of Impact			Levels Of Impacts			
			External		Internal	
			Business Contacts	Industry	Organisation	Task
Input	Output	Communication (2 way)	Collaborative work made easy Helplines online	Expert Support	Management to staff dialogue improved	Collaboration between tasks Enhance speed of task
		Information Retrieval (1 way)	Access to static data (eg specs) Dynamic updates of changing data sources	Industry data of use to members	Intranet/Internet access to business wide data	More data for input to process
		Knowledge Management	Distribution of Knowledge Accessibility of expertise/ product	Contribution to industry wide expertise(eg. best practice, working parties)	Improved opportunity for maintenance of business knowledge longer term	Storing of knowledge improved Mobility of task knowledge improved
		Productivity (Use of Knowledge)	Mode of delivery improved/ made cheaper	Participation in industry	Training and sharing of knowledge around business	Speed of distribution Modes of delivery altered
		Environment (context of impact)	Intranets/Extranets Discussion groups	Industry training and support	Creation of up-to-date computing environment EDI/EC implications Computing expertise needed across business Teleworking	Introduction/updating of computing support Reliance on computer for task completion

APPENDIX B: REPRESENTATION OF THE RESEARCH



IS Effectiveness Matrix

	Aspect of IT design	Single IT application	Type of IT	All IT applications	Aspect of SDM	An IT Function
Independent Observer						
Individual						
Group						
Organisation						
Country						

Source: Seddon (1997a,b)

APPENDIX C: SEDDON'S (1997A,B) MODELS

Figure C-1 Seddon's (1997a) Respecification of DeLone and McLean's (1992) Internet Impacts Model

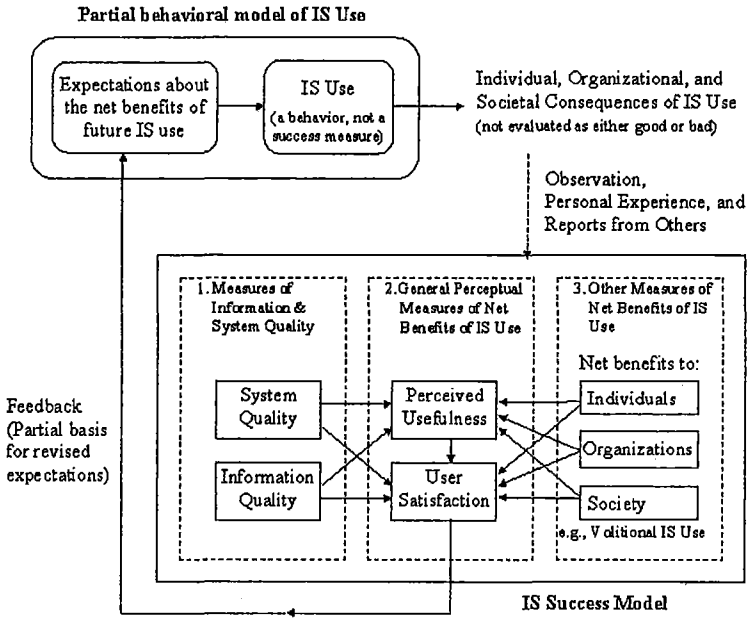


Figure 3: Re-Specified version of DeLone and McLean's (1992) model of IS Success
Source: Seddon (1997)

Key:

Rectangular boxes	IS Success model
Rounded boxes	Partial behavioral model of IS Use
Solid-line arrows	Independent (necessary and sufficient) causality
Dotted-line arrow	Influence (not causal, since observer's goals are unknown)

Figure C-2 Seddon's (1997b) IS Effectiveness Matrix

	Stakeholder/ interest group	(1) An aspect of IT design or use (e.g., algorithm, query language, or user interface)	(2) a single IT application in an organization (e.g., this GDSS)	(3) a type of IT or IT application (e.g., any GDSS, data warehouse, etc.)	(4) all IT applications used by an organization or sub-organization	(5) an aspect of a system development methodology (including reengineering)	(6) an IT function (or its management) in an organization
(1)	**Independent observer** (stakeholder independent)	*Accuracy or speed of algorithm* (Mookerjee, Mannino and Gilson 1995)	*Performance* after learning to use spreadsheet or word processing package (Compeau and Higgins 1995)	*Communication effectiveness* choice between e-mail and face to face (Zack 1993)	*Cumulative abnormal returns* of firms following IT investment announcements by 97 firms, 1981-1988 (Dos Santos, Peffers, and Mauer 1993)	*Accuracy and consistency* of software estimates (mukhopadhyay, Vicinanza, and Prietula 1992)	*Important skills for EIS developers* from survey of current practices (Watson, Ranier, and Koh 1991)
(2)	**Individual** Primary focus: Individual better-offness	*User acceptance of Expert System advice* for expert systems with explanation facilities (Ye and Johnson 1995)	*Creative Performance (fluency, novelty, value), Software satisfaction* of MBA students using creativity enhancement software (Massetti 1996)	*Work-Family conflict* due to after-hours work-related home computer use (Duxbury, Higgins and Mills 1992)	*Self-rated job performance* of users of up to five systems in 25 departments (Goodhue and Thompson 1995)	*User Satisfaction* as consequence of User participation and four moderator variables. (McKeen, Guimaraes, and Wetherbe 1994)	*Service Quality* (Pitt, Watson, and Kavan 1995) (3 firms)
(3)	**Group** Primary focus: Group better-offness	*Post-meeting consensus, degree of confrontiveness, quality of recommendations, satisfaction with process* in variations in GDSS design (Sambamurthy and Poole 1992)		*Equality of participation, Perceived group performance* in GDSS (McLeod and Liker 1992)			
(4)	**Management or Owners (of a firm)** Primary focus: Organizational better-offness	*Perceived usefulness of computer-based information* for financial and operations management (Kraemer, Danzinger, Dunkle, and King 1993)	*Price premium per gallon* for fuel sold via the Cardlock system (Nault and Dexter 1995)	*Reduced inventory holding costs, Reduced premium freight costs* at Chrysler, following introduction of EDI (Murhopadhyay, Kekre and Kalathur 1995)	*Sales growth, ROA, labor productivity* (Weill 1992) (33 firms)	*Cost savings, quality improvement, customer satisfaction* from Business Process Reengineering at CIGNA (Caron, Javenpaa and Stoddard 1994)	*Benefits to the firm* flowing from IT outsourcing: (Lacity and Hirscheim 1993)
(5)	**A Country** Primary focus: Society's better-offness			*Evolution of electronic market* for computerized loan origination. (Hess and Kemerer 1994)	*Productivity, and Consumer Surplus* (Hitt and Brynjolfsson 1996) (370 firms, one country)		Not applicable

APPENDIX D: SAMPLE FOR SITE SELECTION

ICDT	Company Name	Company URL
C	Artlink	http://www.artlink.co.nz/
C	Business Computers Ltd.	http://www.bcl.co.nz/
C	Equestrian Edge	http://www.bisnet.co.nz/equestrian-edge.html
C	Free Listing Service for the New Zealand Car Enthusiast !	http://www.carsonline.co.nz/
C	Gecko Trading	http://homepages.ihug.co.nz/~gecko1
C	Global Inter-trade	http://www.globalinter-trade.co.nz/
C	New Zealand Property	http://www.houses.co.nz/
C	NZ Business Support Systems	http://www.cybermall.co.nz/Canterbury/bss-ghc/bsshmpg.html
C	Stallion Station	http://www.stallion.horse.co.nz
C	The Last Outpost	http://www.lastoutpost.co.nz/
C	Tradebart International ltd	http://www.tradebart.co.nz/
C	Tradenz	http://www.tradenz.govt.nz/
D	92.1 MoreFM	http://www.morefm.net.nz/
D	Adrock Software	http://Adrock.com
D	Beyond City Limits	http://www.beyondcitylimits.co.nz/
D	Canterbury Public Library	http://www.ccc.govt.nz/Library/
D	CTi Christchurch Ltd	http://www.cti.co.nz/
D	Cyberkeys	http://www.cyberkeys.co.nz/
D	Electronic Reference Information Ltd	http://www.eri.co.nz
D	Foyles Books	http://www.foyles.co.nz/
D	G I N Z - Guest in New Zealand	http://www.ginz.com
D	Landmark Software	http://www.lm.co.nz/
D	MagnumMac	http://www.magnummac.co.nz/
D	MicroComm Limited	http://www.microcomm.co.nz/
D	Moneyline Limited	http://moneyline.co.nz
D	New Zealand Science Monthly magazine	http://www.spis.co.nz/nzsm
D	New Zealand Shipping Gazette	http://www.shipping-gazette.co.nz/shipdata/
D	PC-Parts	http://www.pcparts.co.nz/
D	Plains FM96.9 Community Radio	http://canterbury.cyberplace.org.nz/community/plains.html
D	Pykes Auto Court	http://www.gecko.co.nz/pykes.htm
D	RDU 98.3FM	http://www.rdu.org.nz/
D	Realtor - Christchurch's Property Guide	http://www.realtor.co.nz/
D	Sami's	http://www.chch.planet.org.nz/genbiz/samis.html
D	SCA Barony of Southron Gaard	http://www.spis.co.nz/phil/southron.htm
D	Shades Stamp Shop Ltd	http://www.newzeal.com/steve/stamp.html
D	South Pacific Information Services Ltd	http://www.spis.co.nz/
D	Southern Internet	http://southern.co.nz/
D	Southpower	http://www.southpower.co.nz/

ICDT	Company Name	Company URL
D	Syntech Computer Services Limited	http://www.syntech.co.nz/
D	Team Hutchinson Ford	http://www.team-hutchinson-ford.co.nz/
D	Temuka Real Estate Listings	http://homepages.ihug.co.nz/~gecko1/Realestateprices/pricerange.html
D	The Computer Broker	http://www.broker.co.nz/
D	The Globe Cafe	http://www.southern.co.nz/globe/
D	Think Software	http://www.wizkid.co.nz/think/
D	Waipara Springs	http://www.nzwine.com/waipara_springs/
D	WEA - Canterbury Workers Educational Association	http://canterbury.cyberplace.org.nz/community/wea.html
D	Westende Jewellers	http://www.kiwidex.co.nz/westende/
I	02design	http://www.o2design.co.nz
I	A.W. Fraser	http://www.awfraser.co.nz/
I	Ace Creative	http://www.acevideo.co.nz/
I	Ace Training	http://www.acetraining.co.nz/
I	Actech	http://www.actech.co.nz/
I	Active Solutions Limited	http://www.asl.co.nz/
I	Adspecs	http://kohia.ac.nz/E_VerNet/nz/internet/canterbury/internet_advertising/page01.htm#803417
I	Advanced Technology Enterprises Limited	http://www.ate.co.nz
I	Adventure Paragliding Tandem and Tours	http://www.travel.guide.co.nz/kiwi/paragliding/
I	Air Adventures Ltd	http://www.airadventures.co.nz/
I	Airport Car Rentals Ltd.	http://www.airport-cars.co.nz
I	Alchemy	http://www.alchemy.kiwiplaza.co.nz/
I	Alpha Educational Institute	http://www.alpha-educational.co.nz
I	Ambience	http://redbay.com/ambience/
I	An On-line Catalogue of New and Used Copiers	http://www.copier.co.nz
I	ANSO Systems	http://www.anso.co.nz/
I	Antarctic Centre	http://www.iceberg.co.nz/
I	Aoraki Balloon Safaris	http://www.travel.guide.co.nz/kiwi/aorakiballoons/
I	Applied Research Associates NZ Ltd	http://www.aranz.co.nz
I	Armitage Williams Group	http://www.awgroup.co.nz/
I	AROMA New Zealand Ltd	http://www.lynxmedia.co.nz/canterbury/products/aroma.htm
I	Arthur Ellis Limited	http://www.arthurellis.co.nz/
I	ASCO Carbon Dioxide Ltd.	http://www.asco-co2.com
I	Ashcroft and Ives House of Travel	http://www.nzcentrepoint.co.nz/ashives.htm
I	Away from It All -Alpine Walking Ventures	http://www.wizkid.co.nz/afia/
I	Baldwin Son and Carey	http://www.baldwins.co.nz/
I	Bermuda Motors	http://www.wizkid.co.nz/bermuda/
I	Britten Motorcycle Company	http://www.britten.co.nz/
I	Broadbase Financial Consulting	http://www.broadbase.co.nz

ICDT	Company Name	Company URL
I	Buddle Findlay	http://www.budfin.co.nz/
I	C&R Equipment Ltd	http://www.es.co.nz/~crequip
I	Cactus Climbing Equipment Ltd.	http://www.cactusclimbing.co.nz
I	Canterbury Health Laboratories	http://www.chlabs.co.nz/nindex.htm
I	Canterbury Institute of Languages	http://www.canstudy.co.nz/index.html
I	Canterbury International Ltd	http://www.cilnz.co.nz/cilnz/ccc.htm
I	Canterbury Leather International	http://www.cybermall.co.nz/Canterbury/cli-ltd/
I	Canterbury Rugby Football Union	http://www.crfu.co.nz/index.html
I	Canterbury Trails Guided Tours	http://www.canterburytrails.co.nz/
I	Canterbury Wave Ski Club	http://www.netaccess.co.nz/wave/
I	Car Tune	http://www.kiwidex.co.nz/cartune/
I	Carlton Mill Skin & Beauty Clinic	http://www.compumedia.co.nz/carlton/
I	Cashmere Heights Weddings	http://www.chc-weddings.co.nz/
I	CD-CAD	http://www.cd-cad.co.nz/
I	CES Communications Ltd	http://www.cescomm.co.nz/
I	Charles Drace Investment	http://www.cdrace.co.nz/
I	Charter Trucks Limited	http://www.charter.co.nz/
I	Chester's Cafe	http://www.wizkid.co.nz/chesters/
I	Christchurch Casino	http://www.adspecs.co.nz/casino.htm
I	Christchurch International Airport Ltd.	http://www.icair.iac.org.nz/logistics/iac/iac_cial.html
I	Christchurch Tramping Club	http://www.cosc.canterbury.ac.nz/~paul/CTC/
I	Coast to Coast	http://www.intermart.co.nz/coast/
I	Collett Engineering Ltd	http://www.tradebart.co.nz/collett.htm
I	Compumedia	http://www.compumedia.co.nz/
I	Computer and Data Cabling Services	http://www.wizkid.co.nz/cdcs/
I	Connetics Limited	http://www.connetics.co.nz/
I	Craigieburn Valley Ski Club	http://www.craigieburn.co.nz/
I	Crombie Lockwood Insurance Brokers	http://www.crombielockwood.co.nz
I	Croquette Kitchen	http://www.wizkid.co.nz/croquette/
I	Cuningham Taylor Barristers and Solicitors	http://www.ctlaw.co.nz/
I	Curtis Jewellers	http://www.curtisjewellers.co.nz
I	Custom Technology	http://www.wizkid.co.nz/custom/
I	CyberPlace Canterbury	http://canterbury.cyberplace.org.nz
I	Cyclone Computers	http://www.cyclone.co.nz/
I	Datasouth Business Computing	http://www.datasouth.co.nz/
I	Digital Presentations Ltd	http://www.digitalpres.co.nz/
I	DJB Services	http://www.adspecs.co.nz/
I	Dragon Computer Supplies	http://www.es.co.nz/~dragon1

ICDT	Company Name	Company URL
I	Duns and Partners	http://www.duns.co.nz
I	Dynamic Controls Ltd	http://www.DynamicMobility.co.nz/
I	EAP Services - Employee Assistance Programmes	http://eapservices.co.nz/
I	Ecotourism Australasia	http://www.travel.guide.co.nz/kiwi/ecotourism/
I	Enersave Products Ltd	http://www.enersave.co.nz
I	Expo The Digital Media Company	http://www.expo.co.nz/
I	Fennvale Building Products	http://www.fennvale.co.nz/
I	Financial & Corporate Services Ltd.	http://www.investnz.co.nz
I	Fly Fishing Tours	http://www.nzcentrepoint.co.nz/flyfish/
I	Focus On You - Personal Health Assessment Software	http://www.foy.co.nz/
I	Foot Science International	http://www.formthotics.co.nz/
I	Force Computers (NZ) Ltd	http://www.forcenz.co.nz
I	France - The French Way	http://france.co.nz
I	GDC Communications Ltd	http://www.gdc.co.nz/
I	Geac NZ	http://www.geac.co.nz/index.htm
I	Geo-Systems NZ Ltd	http://www.geosys.co.nz
I	GHC Electronics	http://www.cybermall.co.nz/Canterbury/bss-ghc/fm88-108.html
I	GLOVER SEWELL BARRISTERS AND SOLICITORS	http://www.glover-sewell.co.nz/~glovers/
I	Great Circle Software	http://www.greatcircle.co.nz/
I	Greentours Motorcycle Hire	http://www.cybermall.co.nz/greentours/
I	Grimsby's Fine Dining and Cafe	http://homepages.ihug.co.nz/~grimsby/
I	Hamilton Jet	http://www.intermart.co.nz/hamilton.htm
I	Havills Mazer Mead Co	http://www.nzcentrepoint.co.nz/mead.htm
I	Hazard Press	http://www.sirranet.co.nz/hazard/index.html
I	Health Management	http://www.healthnet.co.nz/healthmanage/
I	Hindin Communications	http://www.hindin.co.nz/
I	Hundmeister German Shepherds	http://www.nzdog.co.nz/breeders/hundmeister.htm
I	Hunter Furniture	http://www.furniture.co.nz/
I	inForM Radio	http://www.radioinfo.co.nz/inform.htm
I	Inforplex	http://www.inforplex.co.nz/
I	Integrated Mapping Ltd	http://www.inmap.co.nz/inmap.html
I	Intermart	http://www.intermart.co.nz/
I	Internet Promotions Ltd	http://www.promotion.co.nz/
I	Iron Horse Hobbies	http://homepages.ihug.co.nz/~procter/IRONHH.HTM
I	Jonathan Smart Gallery of Contemporary Art	http://www.canterburypages.co.nz/art/gallery/jsg/index.html
I	Ken Hudson Graphics	http://www.kenhudson.co.nz/
I	Kiwi Adventure Connection - Canterbury	http://kiwiadv.co.nz/Canterbury/
I	Laptops & Lasers	http://www.laptops-lasers.co.nz/

ICDT	Company Name	Company URL
I	LWR Industries Limited	http://www.globalregister.co.nz/lwr/lwr.htm
I	Lynx	http://www.lynx.co.nz/
I	LynxMedia	http://www.lynxmedia.co.nz/canterbury/
I	Macpac	http://www.macpac.co.nz/
I	Mainland Radio Communications Limited	http://www.radioinfo.co.nz
I	Malcolm Graham Screenprinting	http://www.tradebart.co.nz/screen.htm
I	Manufact Data Systems	http://www.manufact.co.nz/
I	Maurice Woodham Ltd	http://www.woodham.co.nz/
I	Maxim	http://www.maxim.co.nz/
I	McEwings Mountain Sports	http://www.mcewings.co.nz/
I	Medi@net	http://www.medianet.co.nz/
I	Mediafusion Interactive Ltd	http://www.canterburypages.co.nz/mfi/mfusion.html
I	Medlab South	http://www.medlabsouth.co.nz/
I	Michael Fiddymont Ltd	http://www.wizkid.co.nz/fiddymont/
I	Middlepark Rest Home	http://www.kiwidex.co.nz/middlepark/
I	'MM Link" NZ's Largest Electronic Commerce Network	http://www.telecom.co.nz/media/file/products/bodies/833000001.html
I	Moloney Motor Court	http://homepages.ihug.co.nz/~gecko1/CarsMoloney/Moloney.html
I	Montage Multi Media	http://www.montage.co.nz/
I	Morgan Williams H.G. Livingstone Ltd MREINZ	http://homepages.ihug.co.nz/~morgan.w
I	Mount Hutt Ski Area	http://www.mtcook.co.nz/SkiAreas/SkiTheBigThree.html
I	Mr Muffler Exhaust Systems	http://www.kiwidex.co.nz/mrmuffler/
I	Natural Classics	http://www.nzsheepskin.com/
I	NetEffect	http://www.neteffect.co.nz/
I	New Zealand CD-Roms	http://www.wizkid.co.nz/wizkid/nzcdrom.htm
I	New Zealand College for Seniors (NZCS)	http://www.lincoln.ac.nz/nzcs/index.htm
I	Novatek Electronics Limited	http://www.novatek.co.nz
I	NZ Centrepoint	http://www.nzcentrepoint.co.nz/danny.htm
I	NZ Internet Adverts	http://www.ourpage.co.nz/
I	O'Donoghue Lindsay Group	http://www.odlgroup.co.nz/
I	OnSite Computer Services	http://www.compumedia.co.nz/onsite/
I	Pacific Satellite Communications Limited	http://www.wizkid.co.nz/pacsat/
I	Palletmakers Limited	http://homepages.ihug.co.nz/~gjbarr/
I	PC Talk Ltd	http://www.pctalk.co.nz/
I	Peak Experience	http://kiwiadv.co.nz/Canterbury/PeakExperience.htm
I	Pentacom Systems Ltd.	http://www.pentacom.co.nz/
I	Photographic Arts	http://www.photoarts.co.nz/
I	Plains Leather Company	http://www.kiwidex.com/plains/
I	PlaNet Gaia	http://www.ch.planet.gen.nz/

ICDT	Company Name	Company URL
I	Potting Time Ltd	http://www.pot.co.nz/
I	PrimeArdour Systems Ltd	http://www.primeardour.co.nz/primeardour/
I	Promethean Webdesign	http://www.promethean.co.nz/
I	Pulse Data International Limited	http://www.pulsedata.co.nz/
I	Rakaia Salmon Safaris	http://www.travel.guide.co.nz/kiwi/rakaiasalmon/
I	Rental Cars	http://www.adspecs.co.nz/rental.htm
I	Revolution Shoes	http://www.revolutionshoes.co.nz/
I	Saab	http://www.wizkid.co.nz/saab/
I	Sandihurst Wines	http://www.wineonline.co.nz/regions/canterbu/sandihst.htm
I	SB International Freight Limited	http://www.sbintl.co.nz/
I	Securicor 3net Limited	http://www.securicor.co.nz/
I	Sharp Gear	http://sharpgear.co.nz/
I	Sharpie's Golf Barn	http://www.tradebart.co.nz/sharpies/
I	Signopsys	http://www.lynx.co.nz/signopsys/
I	Sirranet	http://www.sirranet.co.nz/
I	Sitebuilders Ltd	http://www.sitebuilders.co.nz
I	SKOPE Industries	http://www.skope.co.nz/
I	Small Business Enterprise Centre	http://canterbury.cyberplace.org.nz/community/sbec.html
I	Sound Logic Research	http://www.slr.co.nz/
I	South Sea Books	http://usa.spis.co.nz/ssb
I	Southern Bays Walkways	http://www.travel.guide.co.nz/kiwi/southernbays/
I	Southmark Computers	http://www.southmark.co.nz/
I	Spectra Dobermanns	http://www.nzdog.co.nz/breeders/spectra.htm
I	Sportcalc	http://www.cybermall.co.nz/sportcalc/
I	Sportzmind NZ Limited - Mental Training Sports	http://www.wizkid.co.nz/sportzmind/
I	Steve Welford Automotive Ltd	http://www.tradebart.co.nz/welford.htm
I	Stringer & Son	http://homepages.ihug.co.nz/~stringer
I	Stronechrubie Country Restaurant	http://www.travel.guide.co.nz/kiwi/stronechrubie/
I	Synapse Networks	http://www.synapse.net.nz/
I	Tait Electronics	http://www.tait.co.nz/
I	Target Copy Centre / Paper Plus Bookshop	http://www.target.co.nz/
I	Technology Management Services	http://www.techmgmt.co.nz/
I	Terrace Downs Country Resort and Golf Club	http://www.terracedowns.co.nz/index.html
I	The Acorn Schroeder	http://www.cybermagic.co.nz/acorn/index.htm
I	The Cash Register Doctor	http://www.cashregdoc.co.nz/
I	The Computer Doctor	http://www.radioinfo.co.nz/computer.htm
I	The Kaikoura Coast Track	http://www.voyager.co.nz/~tkct/
I	The Spice of Life - The Hottest Site in New Zealand!	http://www.nzcentrepoint.co.nz/spiceoflife/

ICDT	Company Name	Company URL
I	Torlesse Wines Ltd	http://www.nzwine.com/torlesse/
I	Transformations	http://www.cybermall.co.nz/nz/nlp/
I	Trucost	http://www.trucost.co.nz/index.html
I	Turnaround Consulting	http://www.turnaround.co.nz/
I	UBS - University Bookshop	http://www.nzbooks.co.nz/ubs.htm
I	Video & Computer Specialists Ltd	http://www.computer-service.co.nz/
I	Visual Software Solutions	http://www.vss.co.nz/
I	Walker, E. Peter	http://www.plasticsurgery.co.nz/
I	Wardinskis	http://www.tradebart.co.nz/wardinski.htm
I	Webgrrls(sm) Otautahi	http://www.ch.planet.gen.nz/~women/webgrrls/index.html
I	Wheels Rent-a-Car	http://www.nzcentrepoint.co.nz/wheels.htm
I	While You Wait Studios	http://www.cybermall.co.nz/Canterbury/whileyouwait/
I	Window Treatments	http://www.window-treatments.co.nz/
I	Wordstream Corporation	http://www.wordstream.co.nz
I	Wynn Williams & Co	http://io.knowledge-basket.co.nz/lawlink/wynn/wynn.htm
T	Abell Hire	http://www.abellhire.co.nz
T	Alexanders	http://nzcom.co.nz/SouthIs/Alexanders/index.html
T	Buy Sell & Exchange - Home Page	http://www.buy-sell-exchange.co.nz/
T	CarsDirect	http://www.carsdirect.co.nz
T	Cave Rock Software	http://www.caverock.co.nz/
T	Charlotte's of New Zealand	http://www.charlotte.co.nz/
T	Chukras Vision	http://homepages.ihug.co.nz/~rasingh/chukras/home/index.html
T	Copyland	http://www.copyland.co.nz/
T	Country-Ways and BackCountry	http://www.es.co.nz/~nzshop/home.html
T	Cybermagic	http://www.cybermagic.co.nz/
T	CyberXpress	http://www.cyberxpress.co.nz/
T	Dermatech GLYCOLIC CREAM	http://www.dermatech.co.nz
T	Digiweb - Professional Web Site Hosting Services	http://www.digiweb.co.nz
T	Dilana Rugs	http://www.dilana.co.nz
T	Eco-Wristrest & RSI Manager	http://www2.chch.planet.org.nz/~rowe/
T	Elldridge Lynch International Limited	http://www.ela.co.nz/
T	Fitness Direct	http://www.fitnessdirect.co.nz
T	Florist NZ	http://www.floristnz.co.nz/
T	Gadgets	http://www.southern.co.nz/gadgets/
T	Gamescape Interactive	http://www.gamescape.co.nz/
T	Gamesman, The	http://www.gamesman.co.nz
T	Ground Zero	http://www.ground-zero.co.nz
T	Hi Tech Books	http://www.southern.co.nz/~hitech/

ICDT	Company Name	Company URL
T	Ineda	http://www.ineda.co.nz/
T	Interflora ® New Zealand	http://www.interflora.co.nz/
T	John Marshall & Co Ltd	http://www.joma.co.nz/
T	Keith Nicolson Photography	http://www.photographer.co.nz/
T	Linton Photography	http://www.photo.co.nz/linton/
T	Majestic Liquor	http://www.majesticliquor.co.nz
T	Manaaki Whenua Press Online Bookstore	http://www.landcare.cri.nz/mwpress
T	Mike Pero Mortgages	http://www.homeloans.co.nz
T	Minifies Makeup	http://www.minifie.co.nz/
T	Nationwide Rental Cars Ltd	http://www.nzcentrepoint.co.nz/nationw.htm
T	NetAccess	http://www.netaccess.co.nz/
T	NZ Internet Shop	http://www.cybermall.co.nz/nz/shop/
T	Ohmark Electronics	http://www.cybermall.co.nz/ohmark/
T	Paper Plus Northlands	http://www.target.co.nz/paperplus.htm
T	Pegasus Rental Cars Christchurch City	http://www.rentalcars.co.nz/chchcity/
T	Photo & Video International	http://www.photo.co.nz/photo/
T	Plain Communications	http://www.plain.co.nz/
T	Pro-soma Ltd	http://www.lynx.co.nz/prosoma/
T	Ross Galt Locksmith & Keyservice Ltd	http://www.kiwidex.co.nz/rossgalt/
T	Shoal Bay Press	http://www.nzbooks.co.nz/shoalbay/
T	Spagalimis Pizza Deliveries	http://www.spags.co.nz/
T	Tarot on Line	http://www.nzcentre.com/nzxena.htm
T	The Gamesman	http://www.gamesman.co.nz/
T	The George Hotel	http://www.slh.com/slh/pages/r/rgenewa.html
T	The New Zealand Travel Shop	http://www.nzcentrepoint.co.nz/nzshop/
T	Tradeaid	http://www.chch.planet.org.nz/tradeaid/
T	Wizkid Internet Limited	http://www.wizkid.co.nz/
?	Akaroa Harbour Cruises	http://www.travelmedia.co.nz/level2/akharb/
?	Alpine Horse Safaris	http://www.travelmedia.co.nz/level3/alpine/alpine.html
?	Aqua Vitae	http://www.tpnet.co.nz/pages/aquavitae/
?	Beatson Rentals, Ltd	http://www.tpnet.co.nz/pages/beatson/
?	Beyond Data Systems Ltd	http://www.beyond.co.nz/
?	CADS - Computer Aided Design Systems	http://www.cads.co.nz/
?	Classic Cars	http://www.tpnet.co.nz/pages/classcar/
?	Compass Shipping	http://www.tpnet.co.nz/pages/compass/
?	Computer Systems Implementation	http://www.csi.co.nz/
?	Cook Commercial	http://ourworld.compuserve.com/homepages/Cook_Commercial/

ICDT	Company Name	Company URL
?	D & M Gannaway Ltd Pipe Bags	http://www.nzcentrepoint.co.nz/gannaway/
?	Des Ellery Photography	http://ourworld.compuserve.com/homepages/DES_ELLERY/
?	Dr Wendy Isbell - Homeopathic Doctor	http://www.tpnet.co.nz/pages/isbell/
?	FM Band Expanders	http://www.tpnet.co.nz/pages/moorhouse/
?	Foxton Reinforced Plastics	http://www.kiwidex.com/foxton/
?	Gateway Computers (NZ) Limited	http://www.cia.co.nz
?	Glassworx	http://www.nzcentre.com/glasworx/
?	Goldsmith Fox PKF	http://www.tpnet.co.nz/pages/goldsmithfox/
?	Hanmer Springs Alpine Experience	http://www.travelmedia.co.nz/level3/han/
?	Harcourt Insulation Limited	http://ourworld.compuserve.com/homepages/harcourt/
?	Imagination Design	http://users.netaccess.co.nz/monkery/www/
?	Insite Technology	http://www.insite.co.nz
?	Langdale Wine Estate	http://www.kiwidex.com/langdale/
?	Les Hunter Automotive	http://www.kiwidex.com/lhunter/
?	Magicseal Magnetic Insect Screens	http://www.tpnet.co.nz/pages/magicseal/
?	Markit Graphics	http://www.tpnet.co.nz/pages/markitg/
?	Mt Lyford Ski School	http://www.travelmedia.co.nz/level2/ski/
?	Old Bank Cafe & Bar	http://www.timaru.co.nz/timaru/oldbank/index.html
?	On The Green	http://www.onthegreen.co.nz/
?	Prestige European	http://www.rsoft.co.nz/clients/saabchch/
?	Psybernet	http://www.psybernet.co.nz
?	Royale Tours	http://www.travelmedia.co.nz/level2/royale/
?	RSoft Enterprises	http://www.rsoft.co.nz/
?	Screensign Arts Ltd	http://www.screensign.co.nz
?	Skyseal	http://kalessin.southern.co.nz/skyseal/
?	Sladens	http://www.sladens.co.nz
?	Smith's Bookshop	http://smiths.bookshop.co.nz/
?	Smiths City Service Centre	http://www.tpnet.co.nz/pages/smithscity/
?	Southern Veterinary Supplies 1987 Ltd	http://www.tpnet.co.nz/pages/southvet/
?	StarLIMS	http://www.qss.co.nz/starlims/
?	Swichtec Power Systems Limited	http://www.swichtec.co.nz/
?	TruTrack Ltd	http://www.wisetrack.co.nz/trutrack/
?	Versatile Buildings	http://www.versatile.co.nz/
?	Webwings Aviation Classified Advertising	http://www.webwings.co.nz/
?	Welco Rental Cars	http://www.nzcentrepoint.co.nz/welco/
?	Westco Lagan Limited	http://www.westco.co.nz/
?	Wired Kiwis	http://www.wiredkiwis.co.nz/
?	Wired Technology Management	http://www.wired.co.nz/

APPENDIX E: PILOT STUDY

OVERVIEW OF THE PILOT CASE: FOOTWEAR

The company in the Pilot Case is a Christchurch based manufacturer and exporter of sports and medical insoles. It has ten employees, and an overseas network of distributors spanning eighteen countries. Before the adoption of the Internet, the company made use of a Compuserve account to communicate with business contacts who had e-mail facilities. Any incoming e-mail went directly to one person who would then route it as appropriate. The firm had a reputation in its industry of being at the leading edge of technology. They felt that if this reputation was to be sustained, and if they were to grow further, then the vast marketing potential of the Internet would have to be utilised. The co-founder of the firm agrees that it waited six months longer than necessary before putting up a Web site, but justifies this by saying that the required depth of design talent was not available in New Zealand at the time. The company outsourced the design of the web pages to another local firm. As the site was being designed, the firm's hardware was undergoing a major upgrading process. The original peer to peer network was replaced with a local area network running Windows NT. The addition of a proxy server meant that email no longer had to be routed through one person. The change also meant that everyone in the company could have a PC on their desk with an Internet browser. Phone lines no longer needed to be tied up if an individual wanted to use a modem to connect to the Internet. Access to the Internet is now much simpler for everyone in the company.

From the initial idea to set up a web page, it took three months to get it online. The information on the page is mostly of a static nature, however the company has the ability to make updates to certain pages through the use of templates. Any major design changes go through the Web page Design Company.

IMPACTS OF THE INTERNET

General Comments

In the short time that the company has been actively using the Internet a number of significant impacts have become evident in the firm. Lymer et al.'s (1997b) model has been used to summarise these impacts (Table E-1).

Business Contacts

Some of the strongest impacts came under this heading. The company uses the Internet to keep in touch with customers and distributors. It enables them to retrieve information faster, is helpful with building up information databases about customers. The web page gives the company the ability to provide current news and information from their site, it also gives them much greater flexibility to promote their product, and to distribute product information to a large audience. One of the most important benefits is that having a web site gives the company an image of being on the leading edge. Because the Internet is international, the restrictions of being in such a small, remote country are lifted to an extent. With a .com domain name the company feels that their customers' quality of service perception will be enhanced.

Industry

The main impact in this category is that the company is able to monitor their competitors' web sites. Of course this also goes back the other way. There are long term plans to design sites for their distributors, and possibly to use a targeted marketing company to increase the number of visitors to the page.

The firm is currently contemplating the implementation of online ordering. This is still some time away as security issues need to be worked out, also the company is aware that this initiative could be seen as a major threat to their distributors.

Organisation

The major impacts here are in the environment. The company underwent a radical hardware upgrade to prepare for the introduction of the Internet. They also had to alter their entire marketing strategy to make it compatible with the web. Previously the firm kept its retail and medical operations separate. They had to find a way to keep the distinction while having all the information in one place. E-mail has had little effect on internal communications as the physical office space is small enough such that employees only need shout through the door if they need something.

Task

The Internet has quite subtly altered the working day of employees at the company. Newsgroups are checked regularly, a trip to the library may be replaced with an Internet search. Basically the staff are just becoming more aware of and conversant with new technology that can increase (or not) their productivity. Although many of the impacts here are good, there are several issues that the company still needs to deal with. One is that the mail server only connects to the Internet periodically. This could cause embarrassment if an employee tells a customer that an email is on the way to them. Potentially that email may be waiting at the firm for more than half an hour before being sent on. Another issue that is probably relevant to anyone who uses the Internet is that it has the potential to be a time waster.

Figure E-1 Mapping Data From the Pilot Case to Lymer et al.'s (1997b) Model

Matrix Model of Internet Impacts Lymer (1997)			Levels of Impacts			
			External		Internal	
			Business Contacts	Industry	Organisation	Task
Categories of Impact	Input	Communication (2 way)	Increased flexibility wrt information flows Reduce communication costs Delayed emails issue	Guinea pig for DHL EDI system	Physical office too small to need internal email	Submit to mailing lists / newsgroups
		Information Retrieval (1 way)	Enables easier access to information Faster information retrieval	Enables easier access to information Use net to monitor competitors' sites	Popular sites kept on server to decrease cost	Read newsgroups Competitors web sites Mailing lists
	Output	Knowledge Management	Obtain more information about customers Provide news / information from web site	Improved mgt info for strategic planning (compare traffic levels) No plans for links to competitors	Organisation can respond more quickly to change	Improve accuracy of information Database of customer information Basic info is static – can change news etc with templates
		Productivity (Use of Knowledge)	Distribution of product information Website & .com domain affects quality of service perception Coupon system – tracking	May provoke shift in industry to online sales Security issues though May design sites for distributors		Enhance employee productivity Time spent altering site
		Environment (Context of Impact)	Website gives reach Different languages Internet helps keep leading edge image	Fearful of squeezing out suppliers – changing relationships due to net intention – to push customers to distributors	New hardware to set up new network Enhance credibility and prestige of organisation Staff training Altered marketing strategy – combined retail and medical	Website maintenance Staff becoming more aware of technology

APPENDIX F: INTERVIEW GUIDE AND QUESTIONNAIRE

INTERVIEW GUIDE

introductions.
overview - determining the impacts that the internet has made on firm.
generic company historical / demographic details.
size, number of employees, when founded, turnover, information about internet connection and network
web site data - hits, sales
who in the company uses internet, what for, how long for, company policy on usage - (reasons?)
get as much nonprompted data as possible before steering towards categories from Lymer and the other frameworks from the literature, to try to discover the impacts on the firm.

Copies of the other frameworks (Appendix G) on hand for prompting
Administer Lederer et al.'s questionnnaire
Permission for follow up calls, emails.

LEDERER ET AL.'S (1997) QUESTIONNAIRE

Internet Impacts Questionnaire

Please rate from 1 (low) to 7 (high) the effectiveness of the Internet in helping your business with the following:

enhance competitiveness or create strategic advantage
enable easier access to information
provide new products or services to customers
increase the flexibility of information requests
improve customer relations
enhance credibility and prestige of organisation
provide better products or services to customers
increase volume of information output
align well with stated organisational goals
enable the organisation to respond more quickly to change
enable faster retrieval or delivery of information or reports
help establish useful linkages with other organisations
save money by reducing communications costs
change the way the organisation conducts business

increase return on financial assets
enhance employee productivity or business efficiency
speed up transactions or shorten business cycles
improve accuracy or reliability of information
present information in a more concise manner or better format
enable the organisation to catch up with competitors
allow previously infeasible applications to be implemented
improve management information for strategic planning
improve information for management control
allow other applications to be developed faster
provide the ability to perform maintenance faster
save money by avoiding the need to increase the workforce
save money by reducing travel costs
save money by reducing the work force
save money by reducing hardware cost

APPENDIX G: FRAMEWORKS OF IS IMPACT AND EFFECTIVENESS

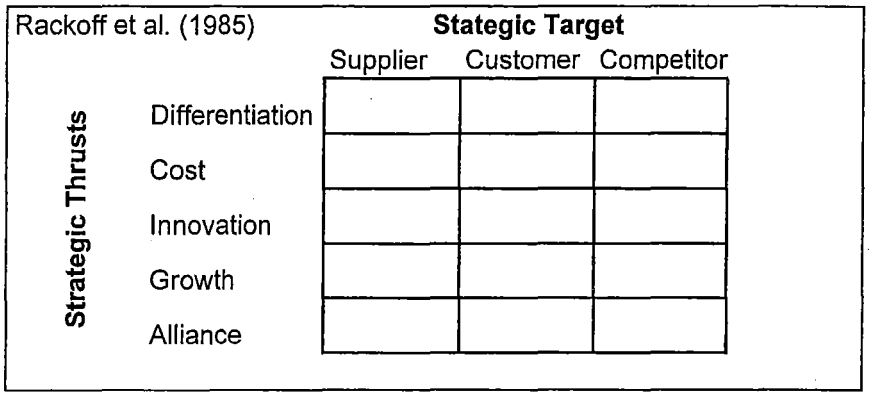
Porter's (1980) competitive forces model (Table G-1) was an early attempt to determine the effect of competition in a marketplace. This model is still relevant for assessing the impacts of the Internet on firms today. The model makes it clear that "competitive advantage can come about by changing the balance of power between a business and the other actors in the industry" (Martin et al., 1994, p. 513) simply by: 1) inhibiting the entry of new competitors by raising the stakes for competing in the market. 2) eliminating the threat of substitute products by providing feature that are difficult to replicate. 3) differentiating products from those of competitors. 4) decreasing the bargaining power of customers by making it easier for them to do business with the company, and more difficult for them to do business with others. 5) making stronger links with suppliers to obtain lower cost, higher quality materials. The Internet can potentially impact all of those areas.

Table G-1

Porter (1980)
Rivalry among existing competitors
Threat of new entrants
Threat of substitute products and services
Bargaining power of buyers
Bargaining power of suppliers

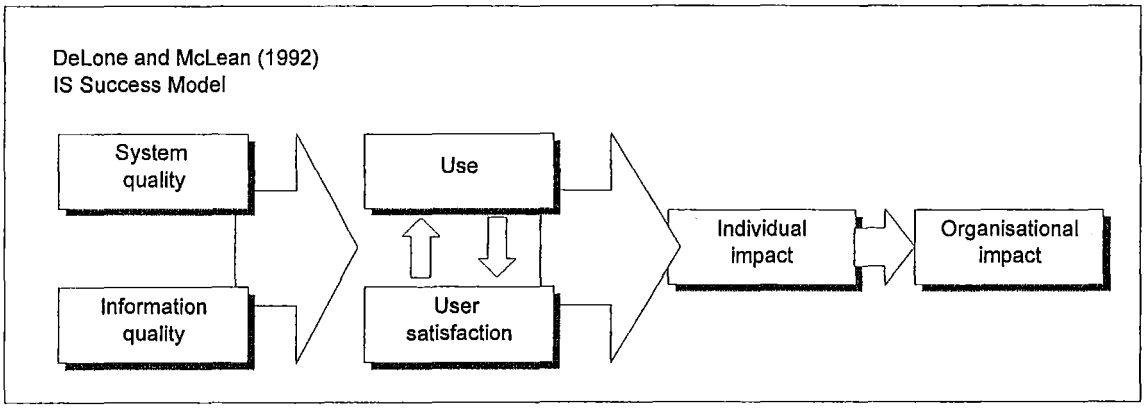
Rackoff et al.'s (1985) strategic thrusts model (Figure G-1) is another early model that has application for the Internet. The framework consists of strategic targets: suppliers, competitors, customers; and strategic thrusts: differentiation of products, lower costs, innovation resulting in a change in the nature of business, growth of market or diversification of product, and alliances between the firm and its strategic targets. The model has been used successfully to analyse strategic IS initiatives (Martin et al., 1994).

Figure G-1



DeLone and McLean (1992), responding to Keen's (1980) challenge to find the dependent variable of IS success attempted to synthesise the research in the area carried out between 1981 and 1987 (Figure G-2). They concluded that there was no one IS success measure, but six interdependent dimensions to IS success: System quality, information quality, use, user satisfaction, individual impact, and organisational impact. Many authors have adopted this multi-variable approach, but as late as 1997 Tallon et al. (1997) commented that "most empirical studies tend to define IT business value largely in terms of a single dependent variable - productivity" (p. 847).

Figure G-2



Grover et al. (1994), heeding Delone and McLean's (1992) suggestion that multiple measures of IS success should be established, and that both internal and firm impacts should be considered, developed an Internet success model also (Table G-2). The model can be used to rate the impact of the Internet on the two market based dimensions of:

contribution to organisational profitability, improvement of services provided, and three firm based dimensions of: diffusion, user satisfaction, and frequency of use.

Table G-2

Grover et al. (1994)	
Market based impacts	**Internal impacts**
Contribution to organisational profitability	Diffusion
Improvement of services offered	User satisfaction
	Frequency of use

Farbey et al. (1992) also recognised that there is no one method for analysing the success of Information Technology. "The quest for the one best method is proving fruitless because the range of circumstances to which that technique would have to be applied is so wide that no one technique can cope" (p. 109). In a longitudinal study of anticipated and unexpected benefits from IT they classified these benefits into five major groups: efficiency, functionality, communications, management, and strategy (Table G-3).

Table G-3

Farbey et al. (1992)
Efficiency
Functionality
Communications
Management
Strategy

Chan and Huff's (1993) partial model of IS effectiveness includes dimensions assessing organisational impact, and user satisfaction (two of DeLone and McLean's (1992) success factors). The organisational impacts are: IS contribution to operational efficiency, IS contribution to the establishment of market linkages, IS contribution to management effectiveness, and IS contribution to the creation and enhancement of products and services (Table G-4). Hale and Cragg (1996) adapted Chan and Huff's (1993) instruments for use in small firms.

Table G-4

Chan and Huff (1993)
User satisfaction
Organisational Impact
IS contribution to operational efficiency
IS contribution to the establishment of market linkages
IS contribution to management effectiveness
IS Contribution to the creation and enhancement of products and services

Lucas and Olson (1994) in a study of organisational flexibility propounded three types of major impacts of information technology: 1) it can alter boundaries of where work must be performed, and when it is performed. 2) it affects the nature and pace of work, generally by speeding up the processing of information. 3) it enables the company to respond more rapidly to volatile market conditions (Table G-5).

Table G-5

Lucas and Olson (1994)
Boundaries
Nature and pace of work
Response time

Gable (1994) found that the use of telecommunications based links with customers and suppliers leads to improved internal operations, greater organisational efficiency, and increased bargaining power (Table G-6).

Table G-6

Gable (1994)
Improved Internal operations
Greater organisational efficiency
Increased bargaining power

Sterne's (1995) summary of advantages of an effective Internet strategy include: improved corporate image, improved customer and investor relations, finding new customers, increased visibility, cost reduction, market expansion, and improved internal communications (Table G-7).

Table G-7

Sterne (1995)
Improved corporate image
Improved customer relations
Finding new customers
Increased visibility
Cost reduction
Market expansion
Improved internal communications

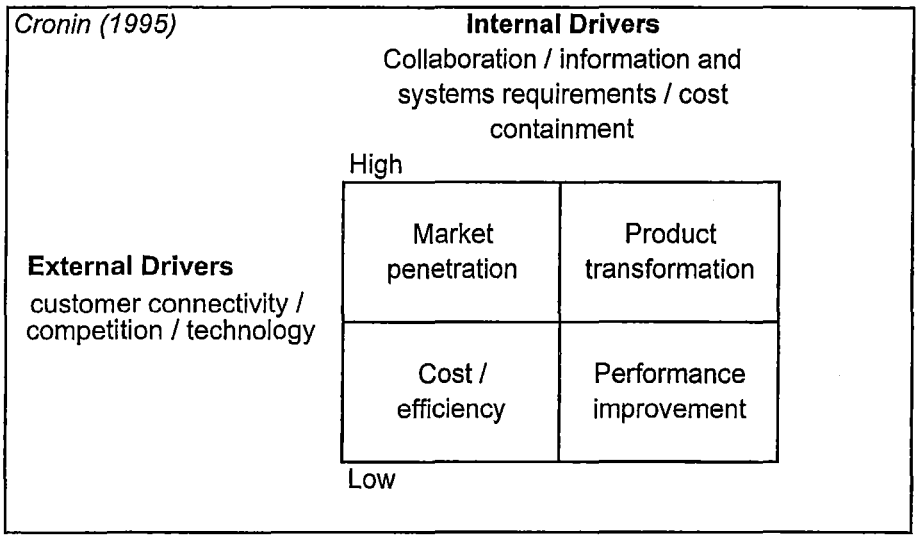
Rao et al. (1995) in a study of competitive advantages attainable through the effective use of EDI listed comparative efficiency, improved relationship between trading partners, and product and service differentiation (Table G-8).

Table G-8

Rao et al. (1995)
Comparative efficiency
Improved relationship between trading partners
Product & service differentiation

Cronin's (1995) strategic positioning matrix identifies four types of strategic Internet impacts, along with the internal and external events or objectives that drive them (Figure G-3). The impacts are 1) market penetration, achieved by extended reach through a Website, or online customer support. 2) product transformation, most likely the creation of Internet based products or services. 3) cost and efficiency savings, by reducing the need for other communications channels both internally, and externally to customers and business partners. 4) performance improvements through using the Internet to assist with shared decision making, support virtual teams, and integrate information resources.

Figure G-3



Ellsworth and Ellsworth (1996) list major business impacts of the Internet: 1) communications using e-mail. 2) corporate logistics, especially with real time communication across distances. 3) globalisation, with companies using the Internet to achieve rapid internationalisation. 4) competitive advantage through creating barriers to entrants, and creating new product opportunities. 5) online collaboration between firms. 6) the use of the Internet as a research tool. 7) marketing and sales through Websites. 8) the instant transmission of data between locations (Table G-9).

Table G-9

Ellsworth and Ellsworth (1996)
Communications
Corporate logistics
Globalisation
Competitive advantage
Online collaboration
Research
Marketing and sales
Instant data transmission

Bloch et al. (1996) designed a framework based on using electronic commerce to add business value (Table G-10). Their three "super-categories" are designed to measure the impact of e-commerce in terms of business results. Improving: product promotion, new sales channels, direct savings, time to market, customer service, brand image.

Transforming: technological and organisation learning, customer relations. Redefining: new product capabilities, new business models.

Table G-10

Bloch et al. (1996)	
Improve it	Product promotion New sales channel Direct savings Time to market Customer service Brand image
Transform it	Technological and organisation learning Customer relations
Redefine it	New product capabilities New business models

Hitt and Brynjolfsson (1996) in their study of the business value of IT chose three measures to study: productivity, consumer value, and business profitability (Table G-11).

Table G-11

Hitt and Brynjolfsson (1996)
Productivity
Business profitability
Consumer surplus

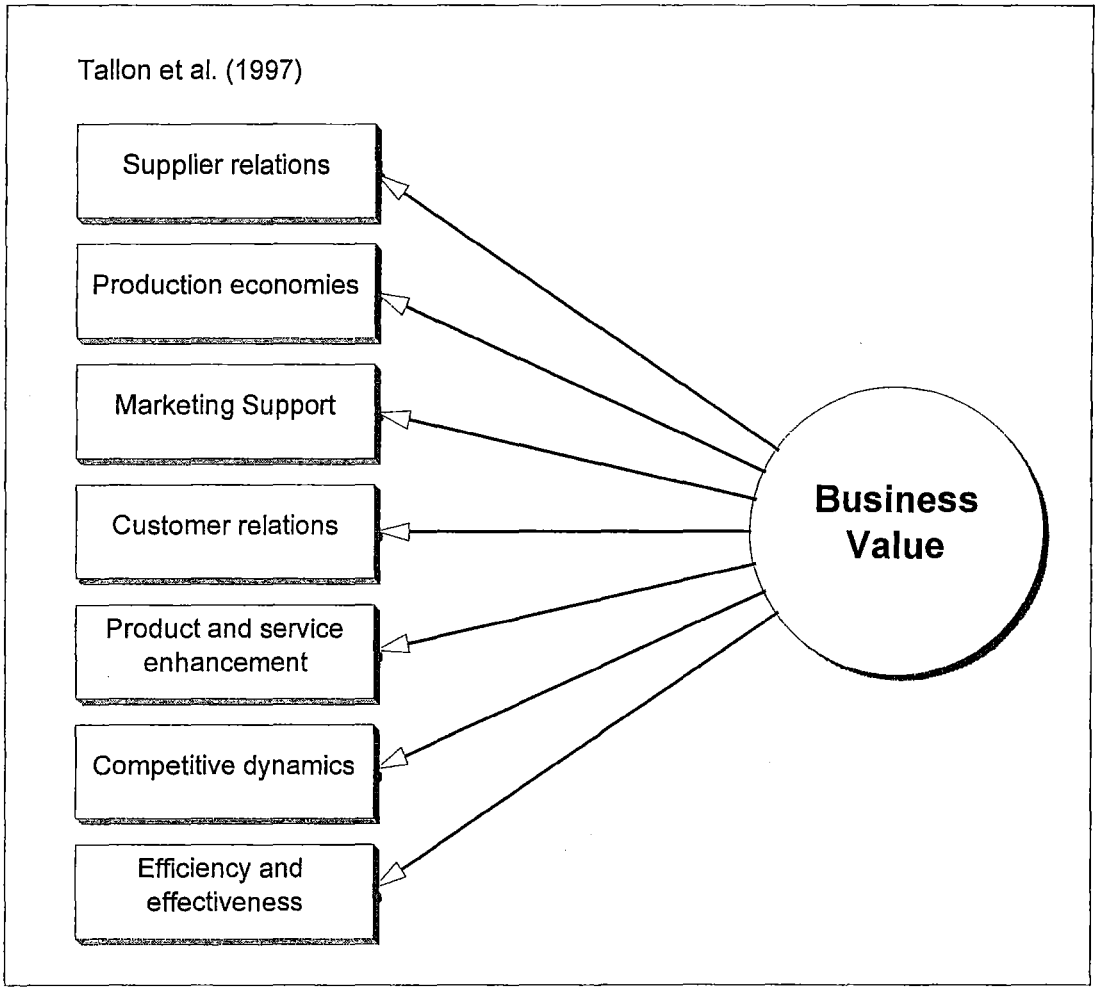
Abell and Black (1997) determined that firms benefited from the Internet by improved communications, availability of expertise, better service and support from suppliers, greater customer satisfaction, and more effective information gathering (Table G-12).

Table G-12

Abell and Black (1997)
Improved communications
Availability of expertise
Better service and support from suppliers
Greater customer satisfaction
More effective information gathering

Tallon et al. (1997) conducted a process oriented study on the contribution of IT to firm performance. The study consisted of a survey, containing 56 business value indicators, that was sent to executives of 350 companies. Factor analysis produced a list of eight dimensions that were used to structure a model of business value: supplier relations, production economies, marketing support, customer relations, product and service enhancement, competitive dynamics, efficiency and effectiveness (Figure G-4).

Figure G-4



Ghorab (1997) performed a study on predictors of information systems adoption which indicated perceived strengths and weaknesses of new systems (Table G-13). Strengths included, revenues, competitive advantage, service quality, costs, and control. Weaknesses were the need for financial justification, startup costs, competition intensification, maintenance costs, and user resistance to change.

Table G-13

Ghorab (1997)	
Perceived strengths	**Perceived weaknesses**
Revenue	Financial justification
Competitive advantage	Startup costs
Service quality	Competition intensification
Costs	Maintenance costs
Control	User resistance to change

APPENDIX H: IMPACTS NOT CLASSIFIED IN LYMER ET AL.'S (1997B) INTERNET IMPACTS MODEL

Table H-1 Impacts Not Classified in Lymer et al.'s (1997b) Model

A2	cosmopolitanism
A3	increased autonomy
C3	information shifts from managers to online sources
H2	improved job satisfaction for consultants and secretaries
J5	increased autonomy
J7	virtual alliances generating new sources of wealth
N1	bypass brokers
N7	avoids having to set up foreign branches
N8	makes exporting easier
N9	avoids having to bother about foreign cultures and business practices
N12	avoids having to obtain foreign representation
N15	makes it easy for foreign customers to order goods
O1	stimulates secondary markets
Q9	wholesalers perturbed because company now competing with them
Q10	strained relationships due to distribution channels being shortened
R13	company must think about security and legal issues

APPENDIX I: CASE WRITEUPS

CASE 1: TOURISM

DATE: 29 SEPTEMBER 1998
INTERVIEWEE: MANAGING DIRECTOR
INTERVIEWER: ROSS MARTIN

The company in Case 1 is a Christchurch based subsidiary to a German travel company. The firm specialises in providing customers, who wish to travel to New Zealand, with a flexible and complete tour package. The company consists of two directors in Christchurch, and several tour guides around New Zealand.

Until about two years ago the company's target market was very small. It distributed brochures to the German speaking market in Germany, Austria, and Switzerland. As only about 60000 German speaking people come here each year, and only 30% of them use tour companies, business was slight. The company was competing for the custom of 18000 tourists, along with around 160 tour companies, most of them very large. In 1996 the company had only one customer.

The main problem that the firm had before it adopted the Internet was marketing. Given the nature of the industry the product is always available, the problem is to find a marketing platform that effectively gets the message to the customer. "*The Internet is the best thing. It is a good way to promote your product, especially for small companies which do not have the resources and distribution channels that the larger companies have*".

The company first set up a World Wide Web page in 1996 as part of a larger Cybermall. Following a business assessment and recommendation by Ernst and Young, the site was moved to a server in the United States, and the company registered its own domain name. This move proved to be extremely successful, the business soared from 1 customer in 1996, to 100 customers in 1997. "*The growth rate is phenomenal, and you don't have to have brochures. The thing is working 24 hours for you, you sleep, it's working!*"

The design and implementation of the Website was outsourced to a local Web design company, although all the pricing updates and many minor changes are made by the people at the company themselves. They find the time and money spent on Web design courses more than worth it to them. They are more knowledgeable about the Internet site, updates can be performed much faster, and for many of the simple tasks that need doing on their site, the $75 per hour fee charged by the design company is prohibitive. However the Managing Director of the company believes that the initial cost for designing and setting up the site was money well spent. A typical brochure takes the firm seven months to produce and hundreds of dollars to mail. In Germany, the success rate of mail-outs is 3-5%. The Internet is much more cost effective in the long run, and in this case, more sucessful.

The Website is divided into four sections. Tours, accommodation, rental vehicles, travel services. Each section gives (among other things) a listing of various companies and their current prices. Everything can be booked through the company, either directly through the Web or by phone / fax. The company believes that is the way of the future - a one stop travel shop for the Internet. "*If a person wants to whalewatch, walk fox glacier, hire a car, fly to Dunedin, whatever ... they can book all of that through one firm*". Although many of the larger businesses that the company deals with are moving toward a direct sales paradigm (effectively cutting out the tour operators), the Managing Director believes that "*if you specialise, and know what you're selling, then you have a chance because people will trust your knowledge.*"

The Website is large, around 250 pages, and maintenance is a big task. In the Accommodation section alone there are more than 400 individual room prices. At the moment the company has to update three different files to put the current room prices on the Web. The firm is in the process of developing a database package to integrate the booking software with the html software. Not only will this save time by eliminating redundant typing, it will dramatically reduce the possibility for the introduction of errors.

Site analysis is performed to a limited degree. A visitor's country of origin is logged, also what they look at, and how long they look at it for. As yet the company is not tracking individual visitors through their site. This may come later on using persistent cookies.

Much of the interest through the Internet comes from the United States (over 50% of hits), UK, and Australia, shifting the focus from Germany. There are very few New Zealand bookings, although there is evidence that people are using the Internet for its convenience. The company recently received a booking from a Wellington person, looking for a place to stay in Wellington. This may be an indication that mice, rather than fingers are now starting to do the walking.

Aside from attracting customers with and to their Website, the company finds the Internet of limited use. E-mail communication with customers plays a big part, largely taking over from the phone, at least at the initial contact stage. E-mail is also used for regular mail-outs and newsletters to customers and business partners. In addition to E-mail the firm focuses on participating in Usenet forums and discussion lists, promoting the company through its signature file while not being to pushy or obviously commercial. To attract customers to the site, the company's URL is printed on business cards, and on the number plate surrounds of the company vehicle. Such things as research, information retrieval, and knowledge management - especially with respect to customers - don't play a big role as yet.

A few other New Zealand companies offer a similar travel service, although generally their pages are not yet as comprehensive as those of the company. The firm hopes to be able to collaborate with them in the future through things such as Webrings and Agent pages.[1] "*We want to make sure that people get accurate information. There is so much information that we can't provide on our page, so the best solution is to link to other sites with Agent pages so we can provide the customer with the best and widest range of information. At the end of the day what do we want? We want to provide a customer service. I think it is very narrow minded to say [to competitors], I won't let you go to my site. If people can see all the things available in New Zealand they may stay longer*".

Now that the company has its basic site set up, it is starting to become more aggressive with its marketing strategies. The company has recently started with banner advertising, which has increased the number of hits to its site by about 30%, however the effect on sales

[1] A page of content sourced from another Website, enveloped in a frame with the referring company's logo.

is not yet clear. Also they are starting to become more aggressive with reselling web space to businesses that it works with. When it was just finding its feet the company would charge $30 to create a one page site for the various firms that it works with, and it had little bargaining power. Now it charges $90, including design, and hosting, which is still just recouping the cost. As the site gains in popularity, and people become more aware of the advantages of having an Internet presence, the company hopes that appropriate businesses may come to them to ask for space, and that reselling will eventually turn into a profitable venture. At the moment however, the feeling is that many small hotels and other businesses lack the vision to understand the potential impact of the Internet for them. "*They have a page, now they're thinking the world is coming to me. But is just doesn't happen like that. They don't realise the hours we spend on search engine updates, Usenet, discussion lists...*" The company distributes a document with marketing tips to all the businesses that it hosts pages for.

The firm has agreements with various places, for example Budget Rent-a-car, Milford track. The company issues vouchers for these businesses which are redeemed by the customer. The price lists for many of the bigger firms are generally maintained by the firm, rather than linking an agent page to the sites of the businesses themselves. The company says the reason is that many of the bigger businesses on the net at the moment are not willing to share their information with smaller companies. The trend is towards direct selling. When asked if that was a threat; if customers would prefer to go straight to the source rather than through the middle man, the Managing Director was not too concerned. "*They are targeting a different type of person. Our target market is not the backpacker who wants to have a car for $27, or the cheapest flight to Dunedin. We take care of people who are not so much worried about the money, but who want to know that if anything goes wrong we can take care of them. That's what they are paying for, security, the convenience of organising the whole trip with one E-mail or phone call, their dream holiday.*"

"*We don't do it for the money, we do it for the pleasure of organising. Of course the money is important, but if you do it just for the money then you are lost. People can see that. If you can prove to the customer that you know what you're talking about, they will trust you and they're not worried about the money. We do our business so people can trust us.*"

CASE 2: FINANCE

DATE: 15 OCTOBER 1998
INTERVIEWEE: SYSTEMS SUPERVISOR
INTERVIEWER: ROSS MARTIN, DR. PAUL CRAGG

The company in Case 2 is a Christchurch based company that specialises in providing foreign exchange, currency management, and market information services to clients both in New Zealand and overseas. The firm was founded in 1986 and currently employs eight permanent staff members.

The company has a local network of 11 PC's, four of them with modems enabling them to connect to the Internet. E-mail is not used for internal communication mainly due to the small physical size of the company's offices. "*Communication in this sort of company is more easily handled by talking to the person or by a memo.*"

Neither does E-mail play a large part in communication outside of the company. Because the cost of a permanent connection to the Internet is prohibitive, the compay has to dial up its Internet Service Provider to send and receive E-mail. In their type of business, timing is a critical factor so the firm has an E-mail to fax gateway. When an E-mail or transaction comes in to their Service Provider, it is faxed to the company within about two minutes, and they can then take action on it. This gateway is crucial to the firm as a cost saving measure.

Until recently, international clients could only deal with the company either through fax or by phone. In April 1997 the company went live with an Internet based direct dealing system. The system was designed with International clients in mind. "*The New Zealand stuff we don't try to put through the Web because we can give clients a better service if we are actually talking to them, Something that isn't always feasible with overseas clients where long distances are involve*". The new system has eventually led to a significant increase in international clients, and that base is still growing.

All of the company's deals are made through fax, whether the original order is through fax, phone, or e-mail. "*There are no precedents for recourse on E-mail, whereas there are on*

fax." The company is also concerned with the risk exposure gained through the Internet. "*If someone reneged on a deal we would be left holding the baby. So until we get a rapport with the client we like to keep transactions down to around $50000.*"

Conceptualisation and design of the Website was conceived internally, however the actual coding was outsourced to a local Web design company. The initial site cost around $30000. A recent update of the site added $10000 to that. "*This is pretty expensive for what we got... the site was running for six months before our first transaction.*"

Updating of the financial rates on the Website is totally automatic. The rates are received through the Reuters frame relay network, a point spread is applied to them and the adjusted rates are uploaded to the Website every twelve minutes. The company also tries to maintain a current market commentary, which is written and manually uploaded to the Website twice daily. Various other data in the form of graphs are also compiled and uploaded less frequently.

The majority of the requests and inquiries through the Web come from the United States (more than 50%), followed by Canada, Japan, Australia, and the United Kingdom. To cater to the Japanese market the firm have created a Japanese version of their site. If interest starts to be shown from other parts of the world the company will consider adding new languages to their site.

Aside from the Website the Internet is not used significantly in the firm. The Managing Director uses it for checking on the Websites of the company's various competitors, and keeping up to date with information on financial news sites. The Systems Supervisor uses it regularly as part of his job. "*I have no time to sit down for hours and read newsgroups, but I subscribe to mailing lists and visit other sites. I also do my best to see what other people are doing in terms of financial trading systems online.*" Other than this, the Internet has not significantly altered the way the company operates. "*There are a few new practices in terms of getting back to a client, but it is pretty minor.*"

In terms of competition, banks and trading agencies are just starting to pull up their socks a little with their Internet strategies. Thomas Cook recently announced the launch of the "first online trading system in New Zealand", and there are also companies in Auckland

and Wellington which have put systems online. But as yet this aspect of financial trading is in its infancy still.

If the major banks were to put direct dealing systems in place, as seems to be the trend with large companies in other industries,[2] the company would consider it to be a small threat. "*It's not something that could put us out of business, as clients from the Internet still form a very small part of our total customer base, but it is more competition.*"

Strategy with attracting customers at the moment is to keep it low profile. "*We don't want to go out there and look like a tall poppy.*" One of the reasons behind this is maintaining favourability with the banks. "*If the banks say that they won't deal with us at certain rates any more, then we're kind of ... in a very difficult position. So we haven't been trying to aggressively market our product.*"

In promoting their Website, the company have pursued a similar strategy. No flashy full page advertisements, they are relying currently on word of mouth and have registered their site with a variety of search engines. Recently Yahoo Australia approached the company to provide financial rates for New Zealand and Australia on Yahoo's financial pages, so there will be more exposure as a result of that. The company has also looked into banner advertising, but found the cost to be restrictive for what they were likely to get back from it. One company was charging upwards of $500 per month for placing banners on a few targeted sites.

The company does not have a comprehensive, written strategy or statement of goals for the Internet. "*We just have ideas, that from time to time get written down. Every so often we do a cost analysis but it always comes up short. At the end of the day we don't see it as generating a significant increase in the business that would warrant the extra expenditure.*"

---

[2] For example, airlines, wholesalers.

The firm acknowledges that it is a loophole they fax out breaking news to their national clients, but do not do the same to the majority of their international clients, either through fax or E-mail. But as yet no plans are underway to rectify this.

Possible future plans for the site include delivery of real time rates for their overseas customers, and a real time chat room where transactions and negotiations could be conducted. This is infeasible at the moment due to the cost of running a dedicated Digital Data Network ($1500 per month). Currently the PSTN is used to dial their ISP when uploads are necessary.

An internal Web Server is also a future possibility, however the same cost issues exist here. The company is not thrilled with the service they are receiving from their current provider. "*They haven't been the most reliable in some of their service ... glitches that happen everywhere but at the end of the day we have missed deals because of downtime.*" In the short term the company hopes to get around this problem by relocating their server to the United States. This would also provide a faster connection for their overseas clients. Currently, New Zealand ISP's do not seem able or willing to guarantee the level of service required. "*From the response, it doesn't seem that they are interested in new business.*"

In the very long term the company hopes to tie the Website into an automatic banking system with funds automatically going to and from company and clients' accounts. Again the business that the Web is generating does not justify this kind of expense yet.

The company has not always considered IT as an important part of its business. A full-time systems supervisor was employed in 1997. Prior to that, the task was farmed out to other people in the company, with a "*do your best*" attitude. There is still not always enough work to justify employing a dedicated IT professional full time, the systems supervisor's work is project oriented. Currently, the Website has taken a back-seat to other projects.

Ultimately the Internet only forms a small part of the company's client base, around 3-5%. As such it doesn't yet play a significant role in generating revenue, and the company is not interested in throwing resources at it. "*There comes a point where you have to sit down and say, this is how much we've spent, now let's just let it grow by plugging away at search engines, and by word of mouth.*"

The significant contribution the Internet has made to the company is allowing them to expand the number of international clients that they have. "*That is the primary target of the Internet for us. Locally there is little penetration, but internationally it is a great way in for us. It is very expensive to go to L.A. or Tokyo and talk to clients, but we can do that very cheaply through the Internet.*"

CASE 3: COMPUTER RETAIL

DATE: 21 OCTOBER 1998
INTERVIEWEE: JOINT MANAGING DIRECTOR
INTERVIEWER: ROSS MARTIN, DR. PAUL CRAGG

The company in Case 3 is New Zealand's largest Apple Macintosh Dealer, with 31 employees in the main Christchurch office, and seven employees in each of the three other major centres. It operates as a retailer, mail order service, and a sub-distributor of Apple Products. "*We're focused on being sort of a one stop shop, so that we have everything, including technical support and a service centre.*"

The company is committed to being on the leading edge of technology as long as they see it can benefit their business. They have had their own Website for over two years. "*We were early adopters of the Internet, and before that we ran our own bulletin board to improve communications between customers and ourselves*" The Web Server is located internally, and the company has a dedicated dual channel ISDN line, servicing the Internet and also the company's Intranet between its offices.

E-mail and messaging is used extensively between the company's offices. The instantaneous nature of this mode of communication helps "*eliminate the head office - branch office mentality, because they can get the information from us as quickly as we can get it to our own people. In any industry when you are behind, and someone else rubs it in that they know something before you, you feel bad. So it pulls the staff closer together.*" Also the cost savings of sending files and communications through the Internet, rather than through fax or phone are substantial.

Every staff member has the ability to access the Internet but for some it has not yet been implemented because there is no need. The company has also had problems with employees spending time on non work related activities. "*We are about to issue an edict that says 'look we've had enough of the private e-mails and the jokes going around. It's all very funny and well and good, but it's not to be done during work hours. It's like extending your lunch break or taking two or three morning tea breaks.*" This seems to be a common

trend with companies that have recently installed e-mail. "*One of our biggest suppliers has banned sending jokes everyday except Friday.*"

While some disciplines need to be put in to place it is generally felt that the benefits significantly outweigh the costs of the new system. "*It's like anything new, when you first start wearing aftershave you splash half the bottle on, then you start pulling it back. The novelty will wear off, and it's certainly saving us in phone bills - a lot.*"

Although the company has been on the Web for around two and a half years, their Website has remained fairly static. They do maintain an e-mail list which customers can sign up for on the Website. "*We send out a weekly update, but we have to be careful that we don't do things like spamming the customers and get them into a junk mail mentality.*"

"*We're at the stage now where the white board is about to be decimated by how we want our Website and Web presence to be. Because it's instant. It's the one source for things. You can send out catalogue after catalogue and they go out of date, but the Webpage always has the latest thing.*" Also because of the cost of operating their own server, and the bandwidth charges, the company has only recently opened its Website up to domains outside New Zealand.

The company is still experimenting with the best way to redesign their Webpage. "*In the car market, if you are BMW or Rolls Royce, look is very important, content is more fixed - the cars can all be profiled in the same way. But when you have 14000 software titles, how can you profile each one?*" "*It's not as simple as just throwing our catalogue up, and we send you that anyway. Also you need people coming away with a common look and feel from the company, the Website has to match the shop and the catalogue. What we want to do is say 'come to the Web for the updates to the catalogue', but we're not going to put anything up until we're sure it is sustainable and maintainable. Currently the person who designs our catalogue is not the same person who designs our Webpage. That person is a good technical geek type person and is self confessed like that. Some of our competitors have somebody full time maintaining their Website, but to justify a $30000 salary we would have to be doing a lot more off the Web than we are right now.*"

Plans are to update the Webpage at least weekly, with specials, and daily as new information or news comes to hand. "*The market is asking for that. Because it's such a changing market, everyone wants the latest and greatest the minute it comes out. Of course because our customers are on the Internet, they find out half the time before we've had a chance, and the New Zealand distributor won't necessarily know about what's going on.*"

The Imac (Internet Mac) was recently released and the company plans to run a club area on their Website. "*It will be somewhere to go with your Imac, and it will list all the new things for it, the things you can do, and you can download the odd game and other bits and pieces.*"

Many of the decisions the company makes regarding the Internet are driven by customer demand. Out of their mailing list of 26000 customers, only 3000 are on the net. "*Until it reaches critical mass, we're not going to shift our focus and do a lot more with our Webpage, although it is a continual evolvement, and we're actually putting some thrust into it now. We've got the technology to do online ordering but we've chosen not to because there are only so many dollars and we'd rather leave the money in our paper catalogue.* " The company's major competitor does have online ordering which only provides 3% of their business. "*Of that 3%, 66% of them actually ring up and say, 'did you get my order?' So it's a security blanket issue still.*"

While many of their competitors have been decreasing their physical presence and marketing more over the Internet, the company has started three new branches around the country. "*We think a lot of people still want to see and touch and feel. No matter how many times you see Suzanne Paul on TV with those exercise machines you can't tell how good the engineering is. We can't carry everything, but we can at least have enough so that people can come and see how substantial we are. So they know we're not going to disappear overnight.*" There are disadvantages to having physical locations however. "*It may be that we become a victim. We could be the place that everyone comes to look at it. But if our pricing is out, they will just go and buy it from some virtual warehouse... What may happen over time is that we will cut down the people in our retail shops. So customers can still go in and kick the tyres but if they want to order, they can do it online or in the shop, and the stock will come from a central source.*"

The company uses their ISDN line and Webserver to host Websites for other businesses. "*We're hosting high end sites so it is generating revenue. We're hosting sites where they are doing online commerce, where it requires some degree of expertise to keep it up and running. We're not just hosting Mum and Dad's Webpage.*"

Relations with suppliers have improved markedly since they have been online. "*When we used to have to rely on the New Zealand distributor for information, we could never find out. For updates and things now, we just go to their homepage. The latest things are up there, and we can download them in the same time as anyone else in the world.*"

The company's major supplier has an online ordering system but the company does not use it yet. "*The main reason is because we're still generating our own system and until we can get it to interface directly into theirs, so we don't have to rekey everything, we figure just let them do it right now.*" There are short term plans to integrate the two systems. "*It would save everybody a lot of grief.*"

Looking towards the future of the Internet "*we'll go the way it takes us. I don't think we'll have a choice. In our industry we will have to be there - win or lose. We think that electronic commerce is a thing that is going to happen to us, but it doesn't have to happen right away. Because of the cost of the resource, we will do things as customer demand asks for them. At the moment there is no demand from our real customer base to provide them with an online help or sales service.*"

CASE 4: IS CONSULTING

DATE: 23 OCTOBER 1998
INTERVIEWEE: SALES MANAGER
INTERVIEWERS: ROSS MARTIN, DR. PAUL CRAGG

The company in Case 4 provides Information Technology services to its clients, specifically in the area of network integration. The company prides itself on being able to provide a "*total solution*" for the customer, from the initial audit and recommendations, through to the installation, and ongoing maintenance and support of the system. The firm has branches in Auckland and Christchurch, with a total of 18 permanent staff members, and can call on additional sub-contractors for specific projects.

The company has had a Web presence for three years, mainly as an introduction to the firm rather than for any revenue generating purpose. "*As far as stats go, and how many hits we are getting, we don't really know, although we do keep an eye on it from time to time. It's a good reference for clients to be able to hit our Website and it has got our company profile on it, along with a few links to suppliers.*"

The Website was designed initially by one of their engineers, but after he left the company, it was decided that "*we didn't really have the time or the internal expertise to keep it up, and we couldn't be bothered.*" So the company outsourced the update and redesign of the site. Since then the site has remained static. "*We've sat round and done nothing, and now we're sort of thinking that we can do a lot more with it. The next stage will be to actually get a sales page up there, with product specials monthly.*" The company recently conducted a sales fax out to their customers which "*just hit a sweet spot on price and product.*" They hope that the same will be true of the Website once the Internet transaction system is up and running. "*It's really money for jam. You don't have to put in a lot of effort. There's not a lot of effort in someone hitting your site and doing a transaction.*"

The company has an Intranet, and every PC has browsing and e-mail capabilities. In the past there have been problems with people using the Internet for non work related purposes, however that is under control now. "*We get accurate stats about what sites*

people are hitting and it is just a matter of sending around a group e-mail at times to control it. We don't have an official policy, just use it responsibly, it is not too hard to find out if someone is abusing the system."

Although their office is small, e-mail is the prevalent mode of communication. "*We have e-mails going all over the place, in fact it gets so silly sometimes that we have to clamp down. For example we have a shared laser printer and our receptionist got a bit carried away at one stage and said that 'if you notice the toner is low please e-mail me.' That is just ridiculous when you can walk 20 feet and yell at her. It's just a matter of knowing when to e-mail and when not to. You know what's going to be productive out of an e-mail and what's just wasting time.*"

E-mail between the company and its clients isn't as common. "*Our emphasis is on client relationships and being face to face with the client. You can't explain a lot of their requirements just by sending them an e-mail.*" One thing that e-mail is used for by the clients is help desk support, where the company guarantees a defined response time for a query. But the company does not actively encourage clients to use e-mail for this purpose. "*They have all the contact details, it's their choice as to which way to do it. Many of them who have e-mail still use the manual form of helpdesk support because maybe it's a way for them to track the problem internally until it's resolved. It just depends on the client.*"

With the company's suppliers it is a very different story. "*We find they are pretty hard to get hold of by phone and it is a lot easier just to e-mail them. Also if we're negotiating price by e-mail, we have it there in writing, it's not just verbal.*" The company also uses the Web extensively. Their major supplier has an online ordering system, and their secondary supplier has stock lists on the Web, so the firm can instantly determine whether stock is available and who to order from. The company is also the only local business to be accredited as a "*Microsoft Solutions Provider, and Novell Net Provider*", and all the technical support from those companies is Internet based.

The company's competitors are also using the Internet, but it is not an area that they are competing in yet. Their biggest competitor has been online for six months, and as is the case with the company, has not spent a lot of effort on their site. "*You'd hit certain references and nothing was there, they hadn't set it up. I think wasting people's time like*

that is quite a deterrent. It's quite amazing that these big companies with big R&D budgets don't see it as a priority. We saw it as a priority to get it set up early so we could then develop it as we went."

One aspect of the company's client services is Datanet. They offer to take care of all Internet related issues, from choosing an Internet Service Provider, to registering a domain name, guiding the client through the Website design process, and advising them of the feasibility of putting in their own Web Server. The company doesn't consider this to be part of their core business however, and at the moment it is not generating significant revenue for the company. "*There are many one man bands out there with low overheads. We don't want to compete, we can't really be bothered in that area.*"

The firm believes their Webpage has been beneficial for them. "*You have to have it these days. We're talking to clients that aren't from Canterbury and they judge you from the Webpage you have. It is an image thing as well. We are a high tech company, we should have a Webpage they can refer to. In a lot of cases customers will hit the Webpage to have a look at your profile rather than you having sent them anything.*"

Although the company currently only deals with businesses in the Canterbury region, they don't foresee a problem supplying other areas with the planned online ordering system. "*We would only have selected items online, and because we are dealing with branded products, all of the warranties come from the manufacturer, so if they do have a problem, they can get satisfaction no matter where they are.*"

There are no plans to put drivers, or other support information on the Website for their clients. "*We will either have links to other sites, or go out and install it ourselves for them. A lot of clients can't be bothered, it is more important to spend their time doing what they're good at. They'd rather we just handled the technical stuff.*"

Other future plans for the Internet include putting more customer references on their site to help with credibility, developing the transaction page, and developing information sharing more with its clients, suppliers, and competitors.

They also want to start imaging many important documents so they can share them over the Intranet between centres. The ideal is to go to a paperless office but "*more paper comes*

out of that laser these days than it ever did." This is partly because the company prints out all of the pricing information they receive from the Internet. "*If our suppliers change the pricing on the Website then the evidence is gone. This way we've actually got a confirmed price printed off.*"

APPENDIX J: DATA AND RESULTS FROM LEDERER ET AL.'S (1997) QUESTIONNAIRE

CASE 1: TOURISM

Table J-1 Questionnaire Results for Case 1

Results Sorted by Category			Results Sorted by Score		
C	enhance competitiveness or create strategic advantage	7	C	enhance competitiveness or create strategic advantage	7
C	provide new products or services to customers	7	C	provide new products or services to customers	7
C	enhance credibility and prestige of organisation	5	I	improve customer relations	7
C	provide better products or services to customers	6	I	enable the organisation to respond more quickly to change	7
C	change the way the organisation conducts business	6	P	enhance employee productivity or business efficiency	7
I	enable easier access to information	5	P	speed up transactions or shorten business cycles	7
I	increase the flexibility of information requests	6	S	save money by reducing communications costs	7
I	improve customer relations	7	C	provide better products or services to customers	6
I	increase volume of information output	6	C	change the way the organisation conducts business	6
I	enable the organisation to respond more quickly to change	7	I	increase the flexibility of information requests	6
I	enable faster retrieval or delivery of information or reports	6	I	increase volume of information output	6
I	improve accuracy or reliability of information	6	I	enable faster retrieval or delivery of information or reports	6
I	present information in a more concise manner or better format	6	I	improve accuracy or reliability of information	6
N	allow previously infeasible applications to be implemented	6	I	present information in a more concise manner or better format	6
N	allow other applications to be developed faster	5	N	allow previously infeasible applications to be implemented	6
P	align well with stated organisational goals	6	P	align well with stated organisational goals	6
P	increase return on financial assets	6	P	increase return on financial assets	6
P	enhance employee productivity or business efficiency	7	P	provide the ability to perform maintenance faster	6
P	speed up transactions or shorten business cycles	7	PC	enable the organisation to catch up with competitors	6
P	provide the ability to perform maintenance faster	6	C	enhance credibility and prestige of organisation	5
PC	help establish useful linkages with other organisations	5	I	enable easier access to information	5
PC	enable the organisation to catch up with competitors	6	N	allow other applications to be developed faster	5
PC	improve management information for strategic planning	5	PC	help establish useful linkages with other organisations	5
PC	improve information for management control	3	PC	improve management information for strategic planning	5
S	save money by reducing communications costs	7	S	save money by avoiding the need to increase the workforce	5
S	save money by avoiding the need to increase the workforce	5	S	save money by reducing travel costs	5
S	save money by reducing travel costs	5	S	save money by reducing the work force	5
S	save money by reducing the work force	5	S	save money by reducing hardware cost	4
S	save money by reducing hardware cost	4	PC	improve information for management control	3

CASE 2: FINANCE

Table J-2 Questionnaire Results for Case 2

Results Sorted by Category			Results Sorted by Score		
C	change the way the organisation conducts business	7	C	change the way the organisation conducts business	7
C	enhance competitiveness or create strategic advantage	5	S	save money by reducing travel costs	7
C	enhance credibility and prestige of organisation	4	C	provide better products or services to customers	6
C	provide better products or services to customers	6	I	enable faster retrieval or delivery of information or reports	6
C	provide new products or services to customers	4	PC	help establish useful linkages with other organisations	6
I	enable easier access to information	2	C	enhance competitiveness or create strategic advantage	5
I	enable faster retrieval or delivery of information or reports	6	I	enable the organisation to respond more quickly to change	5
I	enable the organisation to respond more quickly to change	5	I	improve customer relations	5
I	improve accuracy or reliability of information	4	I	increase the flexibility of information requests	5
I	improve customer relations	5	N	allow previously infeasible applications to be implemented	5
I	increase the flexibility of information requests	5	P	align well with stated organisational goals	5
I	increase volume of information output	4	P	increase return on financial assets	5
I	present information in a more concise manner or better format	4	S	save money by avoiding the need to increase the workforce	5
N	allow other applications to be developed faster	3	S	save money by reducing communications costs	5
N	allow previously infeasible applications to be implemented	5	C	enhance credibility and prestige of organisation	4
P	align well with stated organisational goals	5	C	provide new products or services to customers	4
P	enhance employee productivity or business efficiency	3	I	improve accuracy or reliability of information	4
P	increase return on financial assets	5	I	increase volume of information output	4
P	provide the ability to perform maintenance faster	3	I	present information in a more concise manner or better format	4
P	speed up transactions or shorten business cycles	4	P	speed up transactions or shorten business cycles	4
PC	enable the organisation to catch up with competitors	4	PC	enable the organisation to catch up with competitors	4
PC	help establish useful linkages with other organisations	6	N	allow other applications to be developed faster	3
PC	improve information for management control	3	P	enhance employee productivity or business efficiency	3
PC	improve management information for strategic planning	3	P	provide the ability to perform maintenance faster	3
S	save money by avoiding the need to increase the workforce	5	PC	improve information for management control	3
S	save money by reducing communications costs	5	PC	improve management information for strategic planning	3
S	save money by reducing hardware cost	3	S	save money by reducing hardware cost	3
S	save money by reducing the work force	3	S	save money by reducing the work force	3
S	save money by reducing travel costs	7	I	enable easier access to information	2

CASE 3: COMPUTER RETAIL

Table J-3 Questionnaire Results for Case 3 (Managing Director)

Results Sorted by Category			Results Sorted by Score		
C	change the way the organisation conducts business	5	C	provide better products or services to customers	6
C	enhance competitiveness or create strategic advantage	3	I	enable easier access to information	6
C	enhance credibility and prestige of organisation	5	I	improve accuracy or reliability of information	6
C	provide better products or services to customers	6	I	increase volume of information output	6
C	provide new products or services to customers	5	P	provide the ability to perform maintenance faster	6
I	enable easier access to information	6	PC	help establish useful linkages with other organisations	6
I	enable faster retrieval or delivery of information or reports	5	PC	improve management information for strategic planning	6
I	enable the organisation to respond more quickly to change	3	S	save money by reducing communications costs	6
I	improve accuracy or reliability of information	6	S	save money by reducing travel costs	6
I	improve customer relations	2	C	change the way the organisation conducts business	5
I	increase the flexibility of information requests	5	C	enhance credibility and prestige of organisation	5
I	increase volume of information output	6	C	provide new products or services to customers	5
I	present information in a more concise manner or better format	5	I	enable faster retrieval or delivery of information or reports	5
N	allow other applications to be developed faster	4	I	increase the flexibility of information requests	5
N	allow previously infeasible applications to be implemented	5	I	present information in a more concise manner or better format	5
P	align well with stated organisational goals	4	N	allow previously infeasible applications to be implemented	5
P	enhance employee productivity or business efficiency	2	PC	enable the organisation to catch up with competitors	5
P	increase return on financial assets	3	S	save money by avoiding the need to increase the workforce	5
P	provide the ability to perform maintenance faster	6	S	save money by reducing hardware cost	5
P	speed up transactions or shorten business cycles	3	N	allow other applications to be developed faster	4
PC	enable the organisation to catch up with competitors	5	P	align well with stated organisational goals	4
PC	help establish useful linkages with other organisations	6	PC	improve information for management control	4
PC	improve information for management control	4	C	enhance competitiveness or create strategic advantage	3
PC	improve management information for strategic planning	6	I	enable the organisation to respond more quickly to change	3
S	save money by avoiding the need to increase the workforce	5	P	increase return on financial assets	3
S	save money by reducing communications costs	6	P	speed up transactions or shorten business cycles	3
S	save money by reducing hardware cost	5	S	save money by reducing the work force	3
S	save money by reducing the work force	3	I	improve customer relations	2
S	save money by reducing travel costs	6	P	enhance employee productivity or business efficiency	2

Table J-4 Questionnaire Results for Case 3 (Systems Consultant)

Results Sorted by Category			Results Sorted by Score		
C	change the way the organisation conducts business	4	I	enable easier access to information	7
C	enhance competitiveness or create strategic advantage	5	I	enable faster retrieval or delivery of information or reports	7
C	enhance credibility and prestige of organisation	6	I	improve accuracy or reliability of information	7
C	provide better products or services to customers	5	P	speed up transactions or shorten business cycles	7
C	provide new products or services to customers	5	S	save money by reducing communications costs	7
I	enable easier access to information	7	C	enhance credibility and prestige of organisation	6
I	enable faster retrieval or delivery of information or reports	7	I	enable the organisation to respond more quickly to change	6
I	enable the organisation to respond more quickly to change	6	I	improve customer relations	6
I	improve accuracy or reliability of information	7	I	increase the flexibility of information requests	6
I	improve customer relations	6	I	present information in a more concise manner or better format	6
I	increase the flexibility of information requests	6	P	enhance employee productivity or business efficiency	6
I	increase volume of information output	4	PC	help establish useful linkages with other organisations	6
I	present information in a more concise manner or better format	6	C	enhance competitiveness or create strategic advantage	5
N	allow other applications to be developed faster	4	C	provide better products or services to customers	5
N	allow previously infeasible applications to be implemented	4	C	provide new products or services to customers	5
P	align well with stated organisational goals	4	P	provide the ability to perform maintenance faster	5
P	enhance employee productivity or business efficiency	6	PC	enable the organisation to catch up with competitors	5
P	increase return on financial assets	4	C	change the way the organisation conducts business	4
P	provide the ability to perform maintenance faster	5	I	increase volume of information output	4
P	speed up transactions or shorten business cycles	7	N	allow other applications to be developed faster	4
PC	enable the organisation to catch up with competitors	5	N	allow previously infeasible applications to be implemented	4
PC	help establish useful linkages with other organisations	6	P	align well with stated organisational goals	4
PC	improve information for management control	2	P	increase return on financial assets	4
PC	improve management information for strategic planning	2	S	save money by avoiding the need to increase the workforce	3
S	save money by avoiding the need to increase the workforce	3	PC	improve information for management control	2
S	save money by reducing communications costs	7	PC	improve management information for strategic planning	2
S	save money by reducing hardware cost	1	S	save money by reducing hardware cost	1
S	save money by reducing the work force	1	S	save money by reducing the work force	1
S	save money by reducing travel costs	1	S	save money by reducing travel costs	1

CASE 4: IS CONSULTING

Table J-5 Questionnaire Results for Case 4

Results Sorted by Category			Results Sorted by Score		
C	enhance competitiveness or create strategic advantage	5	I	enable the organisation to respond more quickly to change	7
C	provide new products or services to customers	4	PC	help establish useful linkages with other organisations	7
C	enhance credibility and prestige of organisation	5	C	provide better products or services to customers	6
C	provide better products or services to customers	6	I	enable easier access to information	6
C	change the way the organisation conducts business	4	I	increase the flexibility of information requests	6
I	enable easier access to information	6	I	improve accuracy or reliability of information	6
I	increase the flexibility of information requests	6	P	align well with stated organisational goals	6
I	improve customer relations	2	P	enhance employee productivity or business efficiency	6
I	increase volume of information output	4	P	speed up transactions or shorten business cycles	6
I	enable the organisation to respond more quickly to change	7	P	provide the ability to perform maintenance faster	6
I	enable faster retrieval or delivery of information or reports	5	S	save money by reducing communications costs	6
I	improve accuracy or reliability of information	6	C	enhance competitiveness or create strategic advantage	5
I	present information in a more concise manner or better format	5	C	enhance credibility and prestige of organisation	5
N	allow previously infeasible applications to be implemented	3	I	enable faster retrieval or delivery of information or reports	5
N	allow other applications to be developed faster	3	I	present information in a more concise manner or better format	5
P	align well with stated organisational goals	6	PC	improve management information for strategic planning	5
P	increase return on financial assets	4	PC	improve information for management control	5
P	enhance employee productivity or business efficiency	6	C	provide new products or services to customers	4
P	speed up transactions or shorten business cycles	6	C	change the way the organisation conducts business	4
P	provide the ability to perform maintenance faster	6	I	increase volume of information output	4
PC	help establish useful linkages with other organisations	7	P	increase return on financial assets	4
PC	enable the organisation to catch up with competitors	3	N	allow previously infeasible applications to be implemented	3
PC	improve management information for strategic planning	5	N	allow other applications to be developed faster	3
PC	improve information for management control	5	PC	enable the organisation to catch up with competitors	3
S	save money by reducing communications costs	6	S	save money by reducing travel costs	3
S	save money by avoiding the need to increase the workforce	2	I	improve customer relations	2
S	save money by reducing travel costs	3	S	save money by avoiding the need to increase the workforce	2
S	save money by reducing the work force	2	S	save money by reducing the work force	2
S	save money by reducing hardware cost	2	S	save money by reducing hardware cost	2

SCORES OVER ALL CASES:

Table J-6 Scores for Lederer et al.'s (1997) Questionnaire Over All Firms

	Case 1	Case 2	Case 3	Case 4	**mean**
Productivity	6.4	4	3.6	5.6	**4.90**
Competitiveness	6.2	5.2	4.8	4.8	**5.25**
Information	6.125	4.375	4.75	5.125	**5.09**
New Applications	5.5	4	4.5	3	**4.25**
Cost Savings	5.2	4.6	5	4.4	**4.80**
Planning and Control	4.3	4	4.2	5	**4.38**

APPENDIX K: REVISED MODEL OF INTERNET IMPACTS

Figure K-1 Revised Model of Internet Impacts

Revised Model of Internet Impacts		Market impacts			Internal Impacts
		Customers	Suppliers	Business Partners/ Competitors	Organisation
Strengths / Weaknesses	Information				
	Revenue / Costs				
	Productivity				
	Reach / Range				
	Culture / Image				
	Operational Innovation New or better products or services or skills				
	Strategic Innovation New or better relationships / alliances or ways of doing business				
Opportunities					
Threats					